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VETERINARY MEDICINE

OCTOBER 1943

CONTENTS

Veterinary Progress, Policies and Comment.....361-375

The 80th Annual Meeting of the American Veterinary Association, 361; Excerpts of Reports of Committees, Papers and Addresses Presented at the Meeting, 362-369; President Charles W. Bower, 363; President-elect James Farquharson, 364; The Army Veterinary Corps, 365; Junior Veterinarians Needed in War Food Administration, 369; Tuberculosis Fought with Publicity, 370; Fish Juice May Save Lives, 370; Study Protein in Feeds, 370; Mark Welsh Goes to Lederle, 370; Rationing of Meat, 370; Pounds of Feed per Pounds of Meat, 370; Hypo-pituitarism in Sows, 371; Insects More Deadly Than Wild Animals, 371; Sex Among Lower Animals Predetermined, 371; Professor Wooldridge Retires, 372; Vitamins Increased by Germination, 372; Comparative Content of Vitamins in Green and Mature Soybeans, 372; Save Feed by Saving Pigs, 372; Development of Blood Transfusion, 373; Anthrax Traced to Hides, 373; Hog-Cholera Serum Output Breaks Previous Records, 373; Production of Dairy Cows 100 Years Ago and Now, 374; Certified Milk for New York to Be Pasteurized, 374; California Plan for Vaccination for Bovine Brucellosis, 374; Sodium Bicarbonate Should Be Used with Sulfadiazine, 375; Meat Substitute, 375; O.C.D. Cautions Against Sulfa Drugs, 375; New Hay Developed at Cornell, 375; Death from Severe Burns, 375; Burns Treated by Paper Tissue, 375.

Animal Industry in Puerto Rico.....376

Wartime Feeding of Swine.....377

Artificial Insemination and Disease Control.....379

The Physiological Approach to the Treatment of Diarrhea.....381

Removal of the Cecal Worm, *Heterakis gallinae*, from Chickens by Feeding Phenothiazine in the Mash.....384

Practical Livestock and Poultry Nutrition.....387

Autobiography of a Veterinary Practitioner.....392

Atypical Necrotic Laryngitis in a Calf.....394

Constipation in a Bull Caused by a Rectal Tumor.....395

Pulmonary Abscess in a Sheep.....395

Pyelonephritis in a Holstein-Friesian Cow.....397

Three Rabbit Ailments.....398

Abstracts.....399-400

Serum and Plasma in Shock, 399; Erysipeloid an Occupational Disease of Veterinarians, 399; Sulfonamides Intraperitoneally, 400; Vitallium Tubes for Blood Vessel Anastomosis, 400.

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Chicago 49, U. S. A.

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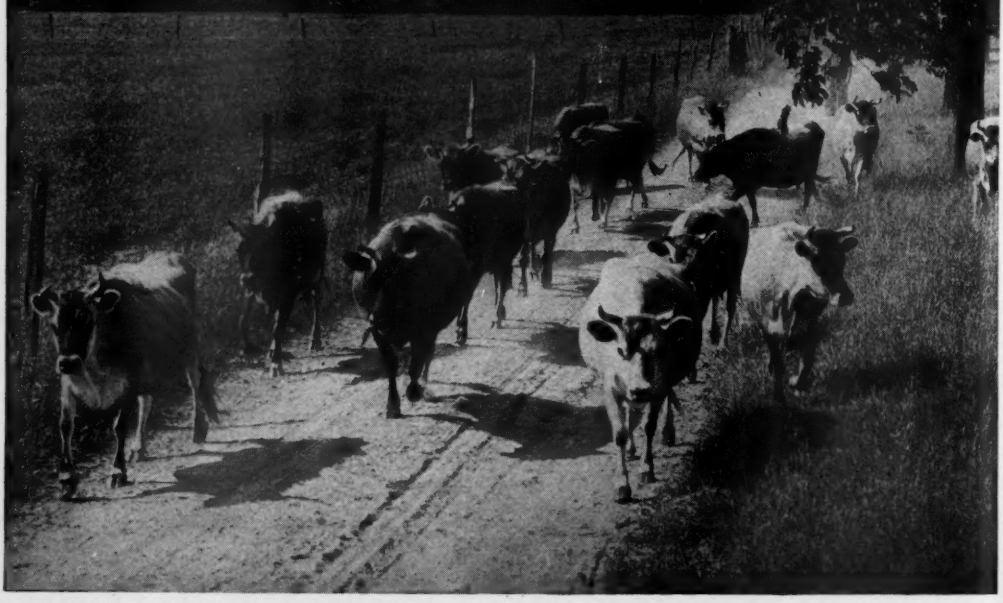

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80th Annual Meeting of the A.V.M.A.

THE Annual Meeting of the American Veterinary Medical Association was held in St. Louis, Mo., August 25 and 26, 1943. The attendance was approximately 700—about one-half the usual attendance at annual meetings of this association. The difficulties of war-time travel and the fact that a large number of veterinarians are in the armed forces or engaged in other essential war work was responsible for the relatively small attendance.

The President, W. W. Dimock, Kentucky Agricultural Experiment Station, presided at the meeting. President-elect C. W. Bower, practitioner, Topeka, Kan., was installed president for the ensuing year and James Farquharson, Professor of Veterinary Surgery and Director of Clinics in the Colorado State College was chosen president-elect. Otto Stader was given the 12th International Veterinary prize.

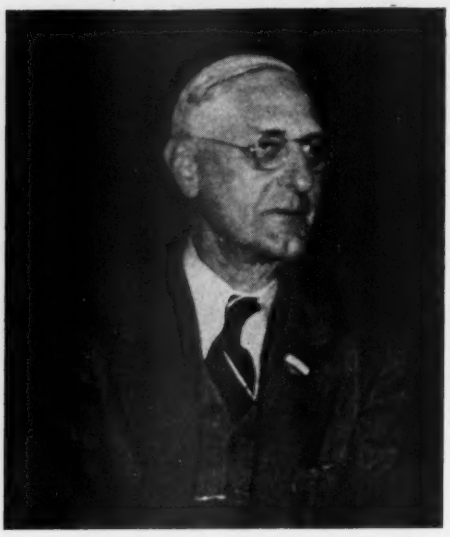
Pertinent paragraphs from committee reports and from papers presented at the meeting follow:

It seems to me that we have reached a time in our development when we must decide whether we shall turn all of the difficult problems over to the federal government, or shall deal with them locally through state and county action. Within a very few years we shall probably have county or area veterinarians who will receive remuneration from federal, state and county funds to enable them to live in isolated sections having a limited livestock population, where a veterinarian would not be able to make a living on fees alone. If the government should contribute to this kind of service, the money should be turned over to the state, to be matched dollar for dollar with state or county funds. The work should then be directed by an official of the state. I am confident that everything that needs to be done for the control of animal diseases can be done without further centralization of authority.

The livestock owner has come to feel that it would be to his advantage to have vitamins A and D available in a form that could be given with a hypodermic syringe, rather than to permit the animal to survive on yellow corn, good alfalfa hay and sunshine. I am not yet ready to believe that special nutritive elements produced synthetically are as adequate in furnishing proper nutrition as the same substances consumed in their native state in the natural feed stuffs.

Some leading authorities have suggested that wheat be used as a corn substitute—even going so far as to say that wheat has

a higher feeding value than corn. If anyone thinks that wheat is a good feed for a brood sow before she farrows and while suckling her pigs, I suggest that he use it



W. W. DIMOCK
Retiring President of the A.V.M.A.

and see what happens. The losses that result from trying to use fibers, hard indigestible roughages and from substituting wheat for yellow corn, because it is cheaper, will amount to much more than the saving.

At a time when there was a surplus of roughage, grains and other forage known to be best for domestic animals, we were spending federal and state money in trying to find out if it wasn't possible to keep animals alive on the cheapest and most indigestible feeds known. I have never become reconciled to the use of cottonseed hulls as roughage for cattle. During the last few years I have had an opportunity to hold autopsies on cattle that had been fed on distillery slop, or on white corn, barley and wheat, and that had cottonseed hulls and straw as roughage. The abnormal condition of the organs and structures of the body presented a graphic picture in striking contrast to that of animals fed on the best of natural feeds.

In reality, the veterinary profession plays a much larger part in the preservation of public health and in preventing the transfer of disease from animals to man than is generally recognized. The unprecedented good health of our armed forces is attributable in no small part to the training and efficiency of the personnel of the Army Veterinary Corps. One need mention only the growing incidence of swine erysipelas and the various paratyphoid infections of animals to emphasize the importance of the veterinary practitioner to public health.—*President's address.*

There will be numerous changes in agriculture when the war is over. The scope and usefulness of the veterinary profession must be broadened in keeping with the changing needs of the nation.

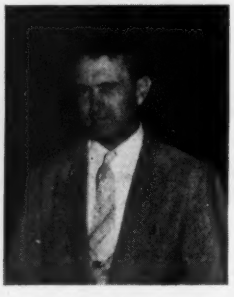
Among the new trends are:

State meat inspection service, for the protection of meats at plants not now inspected by federal veterinarians.

A national and international exchange of professors from veterinary colleges, to broaden veterinary education.

Establishment of internships for graduate veterinarians, as is now done for medical graduates.

A system for collecting and compiling



B. T. SIMMS
Director, Regional Animal Disease Research Laboratory, Auburn, Ala., gave the response to the address of welcome

vital statistics on animal diseases, to aid in fighting disease losses.

When the war ends there will be a change in our whole economic system. It is wise and feasible for the veterinary profession and for all other professions and industries to plan for these changes now, so as to be ready for the greater tasks which will confront the nation in the post-war period.—*C. W. Bower.*

The whole philosophy of disease control is involved in today's swirling currents of thought. Populations are not completely exterminated by devastating plagues, because a percentage of natural immunity, up to complete resistance, usually exists in all species. These survivors are the naturally hereditary immunes. Great progress in

CHARLES W. BOWER
President of A.V.M.A.—1943-44

the development of such strains within species has been made in plant life. Promise can now be made of future limited possibilities extending these principles to animal life.

After the war, how shall we meet the simple fact of increasingly unequal population densities and standards of living? International procedures must be advanced with a scientific program for the best use of land areas. Livestock production is essential to stable agriculture and this, in turn, is essential to an assured food supply. Veterinary aid to animal husbandry in accomplishing this goal is worthy of our greatest efforts.—*G. H. Hart.*

★ ★ ★ BUY WAR ★ ★ ★
STAMPS AND BONDS

We will have to continue to supply much of the food for the world for a considerable time after the war. We will have to supply the breeding stock from which the live-

W. A. HAGAN
Dean, New York State Veterinary College at Cornell University, Ithaca, N. Y.

stock industries of the world can be rebuilt. We will have to do a great deal, also, to meet our own needs. Our living standards have deteriorated greatly during the last year, but this is only the beginning.

The superstitions and hokus-pocus about diseases of farm animals are disappearing. People are interested in having accurate diagnoses of the diseases of their livestock and they want to prevent disease as far as possible, rather than to attempt cures after damage has been done.—*W. A. Hagan.*

Removal of Meat Inspection from B.A.I.

The American Veterinary Medical Association views with deepest concern that part of the Reorganization Order of December 5, 1942, affecting the U. S. Department of Agriculture, which transferred the administration of the Meat Inspection service from the Bureau of Animal Industry to the Food Distribution Division. It feels that the action was unwise in that no apparent improvement in the meat inspection service has resulted and, on the other hand, the disease control service has been greatly weakened by being deprived of control of a large group of trained veterinarians who, in great animal disease emergencies, can be quickly rallied to cope with situations as they arise in different parts of the country. Furthermore, the force of veterinarians in the meat inspection service has always been the principal means by which the

disease control agency has gathered information on the extent and distribution of animal diseases. It does not appear wise to separate functions which are so closely related.—*House of Representatives.*

The association deplores the order removing the meat inspection from the Bureau of Animal Industry, United States Department

JAMES FARQUHARSON
President-elect of the A.V.M.A.

Doctor Farquharson was graduated from Colorado State College in 1921 and he immediately joined the faculty as an instructor in anatomy. He was made Professor of Surgery and Director of Clinics in 1933 and has continued in that capacity in the college. He has been active in association work, having been chairman of several of the committees and a member of the Executive Board of the A.V.M.A. at the time he was elected president-elect of the association. The doctor has published many articles on practical surgery—principally of large animals and has addressed 31 State Veterinary Medical Associations at most of which meetings he has illustrated his presentation with moving pictures

of Agriculture—a poor reward for a half century of public service to health and nutrition in the United States.

It is hoped this change is a war measure only and not a permanent arrangement and that when the war is over meat inspection will again be placed under the direction of the Bureau of Animal Industry, United States Department of Agriculture. —*Com. on Resolutions.*

Uninformed mixers of mineral supplements may use fluorine-bearing rock phosphate, resulting in fluorine poisoning of farm livestock. Farmers should be warned that fluorine is toxic to all forms of animal life. When it is considered that raw rock phosphate may contain as much as 4% of fluorine, it becomes apparent that

NELSON S. MAYO
Chairman of the Committee on Education

the use of even small amounts of this fluorine-bearing rock phosphate may lead to disaster.

Where rations are home-mixed it is better to leave out the phosphorus supplement than to use ordinary unsteamed bone meal or phosphate rock.—*Com. on Animal Nutrition.*

To help meet the army's growing requirements for trained veterinarians, military authorities have now designated the veterinary colleges recognized by the A.V.M.A. in the United States to train such men in the enlisted reserve corps.

Trainees will be on active service as privates in the enlisted reserve corps, will draw privates' pay and will be in uniform where practicable. The training program will be on the same basis as that planned for men being prepared for medical or dental service in the army.

Approximately 415 veterinarians were graduated from the nation's nine accredited colleges of veterinary medicine during 1942. Under the more intensive program now instituted to meet war needs, this total will be increased to approximately 900 during the 1943 calendar year.—*Com. on Education.*

From the Army Veterinary Corps

Since the beginning of the war, although procurement has run into billions of pounds of meat, meat-food and dairy products, and shipments have been made all over the world, no serious outbreaks of disease have resulted from the food supply.

Our primary purpose is to protect the health of our troops by determining that meats, meat-food and dairy products purchased and issued to our troops are safe, wholesome and suitable for food purposes. Inspections for soundness and sanitary conditions are conducted during storage, when moved and when issued for use of troops. In addition, in several foreign countries where we have troops, the Veterinary Corps has done much to improve and develop local meat and milk supplies, assist in the control of animal diseases and in the improvement of sanitary conditions. The help thus extended to the people of these localities has served to promote excellent relations between them and our military forces.

Glanders which was of common occurrence among our animals in World War I, at present, is virtually non-existant in the United States. At places overseas where we have animals, preventive and control measures by our veterinary officers have made the disease of negligible importance.

All horses and mules are immunized against encephalomyelitis by a highly potent vaccine. We have no record of any army horse or mule developing the disease after having been properly immunized by this vaccine. Another practice has been the immunization of horses and mules against tetanus, through administration of tetanus toxoid.

We have thousands of war dogs, and the number is increasing. To properly care for these animals when sick or injured the Veterinary Corps has made provision for

BRIGADIER GENERAL R. A. KELSER
Chief of the Veterinary Corp of the U. S. Army
T. A. SIGLER

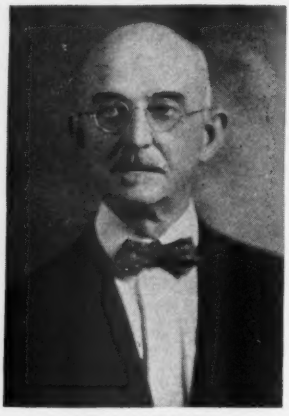
adequate hospital facilities and all necessary drugs, biologics, supplies and equipment.

Our personnel, facilities and equipment are such as to insure that when these faithful beasts are sick or injured they will receive the very best modern surgical and medical treatment, hospitalization and care. Further, special attention is given to preventive measures to afford our military animals every possible protection against serious infectious diseases to which they are ordinarily susceptible.—*Gen. R. A. Kelser,* Director, Veterinary Division, Surgeon General's Office.

Medical service for the average family obliged to live on a restricted budget is a problem in the medical profession today. Perhaps we have a comparable situation among certain groups of farmers and animal owners. An equitable plan for a sys-

tem of animal health insurance which would provide adequate veterinary service might go a long way toward solving this problem.

While today there are better methods of controlling epidemics than during great wars of the past, the hazards are much greater. There never was a time in all history when a watchful public health service was more needed than right now. If the profession does not continue to fight against the perils of introducing dangerous animal diseases from other countries, some plague may thrust itself upon us. We cannot import meat, bone meal and other animal by-products from countries infected with such diseases as foot-and-mouth disease if we hope to remain free from them. There is a tendency to let down the bars during the threatened meat shortage and to allow such meat to be imported. Our economic and social welfare depends on the success of the livestock industry, and it, in turn, depends on our ability to control the diseases which might destroy it.—*Com. on Public Relations.*



T. A. SIGLER

Representative of Horse and Mule Association of America and President of the National Practitioner's Association

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Many thousands of animals are treated every year with bacterins which have no relation to any disease condition which may exist on the premises, or which may be anticipated.

Much of this treatment is by the livestock owner and the biologics most frequently involved are the hemorrhagic septicemia products and the mixed bacterins.

The veterinary profession owes it to the livestock industry to protect owners against this unintelligent use of biological products. This protection involves intelligent diagnosis and the use of products known to have a specific effect in combating specific antigens.—*Com. on Biological Products.*

More than 12,000,000 horses and mules this year are helping American farmers fight the battle for increased food production and, if the rubber shortage continues, horses will be in even greater demand for transportation.

Two-thirds of all farms are now operated by animal power exclusively. Other farms which are more or less mechanized still have, in nearly all cases, one or more pairs of work animals.

The military and farm demand for mules is the greatest since World War I, but the supply is lower by 15% than that of last year. Prices have jumped from $150 to more than $200. Just recently a pair of grade mares in my own neighborhood sold for $400.

Horses and mules are contributing tremendously to the prosecution of the war through the production of food stuffs and there will be an even greater production during the coming year.—*T. A. Sigler.*

Influenza and strangles are probably the most contagious and widely distributed of equine diseases in this country. It is common knowledge that our large auction markets and community sales are hotbeds of infection for both influenza and strangles and are the chief means of disseminating these diseases. Practically all outbreaks of these diseases can be traced directly to contact with animals purchased from these sources. More careful supervision of these auction markets as to sanitation and in-

spection of the animals should be enforced by state livestock sanitary officials as an aid to the war effort.

Dourine is spreading in this country, being most widespread in western states, including California, Colorado, Arizona and New Mexico.

Horse owners are suffering losses of a half-million dollars annually in the middle Atlantic states because of periodic ophthalmia. This disease has been known for over 2,000 years, yet veterinary research workers are still endeavoring to determine the exact cause of it.

Infectious anemia, also known as swamp fever, has also been increasing in this country. Cases of the disease have now been reported in 29 states.—*Com. on Diseases of Horses.*

Seek Amendment to Animal Transportation Laws

From a humane standpoint, as well as to prevent needless livestock losses, farm animals being shipped by truck should be under virtually the same safety and sanitary regulations as now govern such shipments by rail.

Certainly it is as cruel to deprive animals of feed, rest and water when loaded on a truck as when loaded on a railroad car.

An amendment to the present laws on this subject is being presented to members of congress. The amendment provides that no carrier of livestock shall confine animals longer than 28 to 36 consecutive hours without unloading them in a humane manner into properly-equipped pens for rest, water and feeding. Such rest periods to be for not less than five consecutive hours.

Livestock truckers should be licensed by a federal agency and should be required to comply with the same rules as other transportation companies in the handling of livestock. All truck shipments should be accompanied by health certificates showing compliance with federal regulations as well as those of the state of destination.—*Com. on Transportation of Animals.*

More than thirty million head of beef cattle will be required to meet 1943 meat production goals in this country.

Numerous cattle diseases are major hazards in reaching this year's record goals. Extra vigilance on the part of livestock owners and veterinarians in combating these disease menaces is required.

The increase in cattle feeding this year results from an increase in the number of farms feeding cattle, rather than an increase by regular cattle feeders. The strong demand for beef has held live cattle prices at the highest levels permitted by the beef ceilings.

Among the chief livestock disease dangers which could hamper cattle production this year are keratitis, mastitis, necrotic diseases, pneumonia and shipping fever.—*Com. on Diseases of Beef Cattle.*

The war has caused a sharp decline in this nation's fight against bovine brucellosis. The number of cattle tested for the disease has decreased from an average of 575,000 per month last year to approximately 425,000 per month this year. Thus the number of cattle tested under the federal-state cooperative program is only about 72% of the number tested last year. This is the result of several factors, one of which is the lack of available veterinarians.

The vaccinating of calves to control the disease has proved increasingly popular this year. From an average of 8,000 calves per month being vaccinated against the disease a year ago, the number has now increased to approximately 20,000 per month, an increase of 150%. Calf vaccination is now a part of the official plan for the control of brucellosis in 40 states and Puerto Rico.—*Com. on Brucellosis Control.*

In combating calf scours, the transfer of 250 to 500cc of the dam's blood to the calf at birth often has given wonderful results. The new sulfa drugs are also helping materially in fighting losses both from this disease and from calf pneumonia.

Mastitis is the greatest single factor impeding wartime dairy production in this country.

The quality of milk would be greatly improved and the quantity increased 20 to 25% by elimination of mastitis from dairy

T. W. MUNCE
Chairman of Committee on Swine Diseases

cattle. A recent report from New Jersey indicates that half the cows that dairymen are forced to sell as useless are sold because of this disease. In that small state it is estimated that the value of cows sold in one year because their udders are diseased amounts to $2,600,000.—*Com. on Diseases of Dairy Cattle.*

Between 30 and 40% of America's annual pig crop dies before it is ready for market. This provides a clue to our best means of increasing pork production to meet wartime meat shortages.

Four steps which farmers can take to cut down these losses are: improved breeding, feeding, management and disease control.

Only one-third of the farmers in the country follow good practices in the feeding and housing of swine. The four "dangerous D's" in the lives of growing pigs are dust, drafts, dampness and dirt (filth). Hog lots should have good drainage and be cleaned frequently; manure piles and straw stacks should be fenced; hog houses should be warm, dry, well-ventilated and free from drafts.

The greatest disease menaces to swine production include hog cholera, swine erysipelas, enteritis, dysentery, pig scours and influenza.

Cholera strikes so suddenly that the regular immunization of susceptible swine is the only safe procedure. Erysipelas may occur at any point in the United States and in swine of any age. In some sections successful swine raising requires active immunization of swine against this disease. In the control of enteritis, rigid sanitary measures are of paramount importance.

The symptoms of many of these killing diseases are often so confusing that experienced veterinary diagnosis is essential if they are to be combated successfully.

Local feeds in practically all sections require supplementing with products which will supply adequate amounts of proteins, minerals and vitamins. The veterinarian, through sound advice to his clients on feeding, can materially assist in reducing the tremendous losses of feed origin, and thereby assist in increasing our national poundage of pork.—*Com. on Swine Disease Control.*

CLIFF D. CARPENTER
Collaborator with B.A.I. in National Poultry Viability Council

Two hundred million dozen more eggs and 100,000,000 pounds more meat could be poured into America's food stocks by stopping only 5% of the *needless* disease losses which occur in adult poultry flocks today. In many cases, farmers can reduce adult poultry losses 50% by applying modern means of disease control and this is one of

the greatest fields in which the veterinary profession can aid in the war food effort.

In many areas the mortality after chicks leave the brooder house has doubled since 1920. Today, a majority of America's poultrymen lose 35 to 40% of their laying flocks from preventable causes.

One of our major problems is to convince the flock owner of the importance of securing an early and accurate diagnosis when his birds begin to sicken. Too many poultry raisers delay calling their veterinarians until the disease has progressed so far that a large percentage of the flock is endangered.

The poultry industry this year must produce more with less. We must increase our production with actually less available feed, less equipment, less labor and perhaps less stock. Today few layers have adequate floor space and, as floor space per bird decreases, the rate of egg production tends to decrease and mortality tends to increase.—*Cliff D. Carpenter.*

The nation's sheep flocks will provide more than 48 million fleeces for the war effort this year. In addition, more than 24 million sheep will have to be slaughtered to provide the 990 million pounds of lamb and mutton asked for by the Secretary of Agriculture.

It is expected that both goals will be reached unless unlooked-for losses caused by livestock disease or other factors intervene. However, 56 different diseases and problems in sheep production could interfere with reaching these quotas.

The most serious losses in farm flocks are caused by internal parasites. Systematic treatment, pasture rotation, animal rotation and proper feeding all have their place in parasite control. Pasture rotation is as essential for animal health as is crop rotation for successful crop production. Weeds and feeds that are unsuitable for other farm animals are not satisfactory for sheep. Adequate feeding and free access to clean water and common salt will produce heavier fleeces, increase the longevity of the ewes and the livability of the lambs. The lambs will be stronger at birth, grow faster and reach market at an earlier age.

Next to parasite control and proper feeding, strict sanitation is a major requirement in today's sheep production job. Sanitation is not the use of a large amount of disinfectants—sanitation is cleanliness. Clean sheds, clean yards, good ventilation, clean water and protection from exposure to disease and parasites, are essential in a sanitary program.—*Com. on Diseases of Sheep.*

Junior Veterinarians Needed in War Food Administration

The available supply of meat must be increased in order to meet the needs of the Lend-Lease program, our armed forces, war workers and civilians. To meet these needs, the moderate and smaller-sized slaughterhouses of the country are being brought into the supply picture through the meat licensing system.

In order to successfully operate these slaughterhouses, the Government finds it necessary to recruit a great number of junior grade veterinarians for employment in the Department of Agriculture, War Food Administration, Food Distribution Administration.

The duties of the positions include antemortem and post-mortem inspection of food animals and inspection of food products; administration of tests for disease; control and eradication of disease and sanitary inspection of establishments and plants.

Applicants must have completed the full course of study in a veterinary college of recognized standing; however, applications will be accepted from senior students now in attendance at veterinary schools, if otherwise qualified.

The positions pay $2,000 a year (plus $433 overtime pay). There are no written tests and no age limits. Persons now using their highest skills in war work should not apply for these positions. Appointments in Federal positions are made in accordance with War Manpower Commission policies and employment stabilization plans. Before a definite offer of appointment is made, eligibles are cleared through the Procure-

ment and Assignment Service for Physicians, Dentists, and Veterinarians of the War Manpower Commission.

Further information may be obtained at first- and second-class post offices, or from the Civil Service Commission's Regional or Washington offices.

Killing diseases have been fought with charms and herbs, with prayers and incantations, with royal proclamations and medical manifestoes, with nostrums and guinea-pigs. But tuberculosis is preëminently the disease which has been fought with publicity.—*Plague on Us.*

Fish Juice May Save Lives

In clinical tests, two volunteers from the navy lived for 10 days on solid food but no liquid except 10 to 14 ounces of fish juice daily. All lifeboats and life rafts are already equipped with fishing tackle to enable their occupants to secure fish for food—now the same equipment may be used to secure a satisfactory, at least for a time, substitute for water.

Study Protein in Feeds

Substitution of vegetable protein concentrates for such animal protein feeds as are unavailable or prohibitive in cost, under present conditions, is possible, provided that proper adjustments are made in the ration to correct vitamin and mineral deficiencies thus incurred. This is the general conclusion of a new report, "Is Animal Protein an Essential Constituent of Swine and Poultry Rations?" issued by the committee on animal nutrition of the National Research Council.

Prepared by H. H. Mitchell, the report emphasizes that the great effectiveness of animal protein concentrates in promoting maximal production in swine, and particularly in poultry, is not due primarily to their protein constituents, but to their higher content of certain vitamins, calcium, phosphorus and possibly some of the micro-nutrients. When such substitutions are made, according to the report, the protein content of the ration should be raised by one-fourth to compensate for less efficient protein utilization.—*Nat'l Prov.*

Mark Welsh Goes to Lederle

MARK WELSH

Formerly Director, Maryland Live Stock Sanitary Service; Secretary Maryland State Veterinary Medical Association and of the U. S. Live Stock Sanitary Association. Doctor Welsh has become associated with Lederle Laboratories in the Production Department

Rationing of Meat

A six-page pamphlet issued by the American Meat Institute explains, among other things, that the members of our armed forces now consume twice as much food as they did in civilian life; that, because of increased civilian incomes, families are now in a position to spend more money for meat, and that without rationing the limited supply of meat would be inequitably divided.

Pounds of Feed Per Pound of Meat

The amount of feed required to produce a pound of gain in various species of livestock depends of course on many factors—health, vigor, age and breeding of the animal, weather conditions, season, quality of the feed, etc. Tomhave of the Delaware experiment station, after an investigation, concludes that the average requirement of feed per pound of meat produced is approximately, as follows:

Two-pound broilers	3.25	pounds
Four-pound roasters	4.25	"
Eight-pound capons	7.50	"
Ducks	4.10	"
Turkeys	4.50	"
200-pound hogs	4.00	"
350-pound hogs	4.75	"
850-pound cattle	6.60	"
Sheep	6.50	"

Hypo-pituitarism in Sows

During the past few years it has been an ever-increasing occurrence for veterinarians to be summoned to cases of post-parturient agalactia. In this district, the condition has been markedly more prevalent during the last six months than formerly. Undoubtedly this is due to the increased wartime production of swine.

An etiological supposition is that the pituitary body has functioned so much in developing the mammary glands during pregnancy that insufficient secretion remains to stimulate milk production following parturition. (A deficiency of prolactin.)

A description of a typical case can be simplified by saying it is mastitis in a very acute form though it is not of bacterial origin. The ailment manifests itself immediately or up to three days following farrowing and must be differentiated from hypocalcemia. As one is usually not consulted till about 24 hours after farrowing the history is as follows: The owner reports that the sow was reluctant to rise in spite of the fact that she farrowed without difficulty. The pigs look gaunt and squeal abnormally as if hungry.

Examination of the patient reveals that the mammary glands are severely swollen, hot and painful. There is a diffuse redness about the glands and no secretion of milk. The sow lies on her abdomen constantly and refuses to allow the young to nurse, or if the pigs are being allowed to suckle, they fail to obtain nourishment. Hence the gauntness and resulting mortality.

In addition, the sow manifests inappetence, a temperature of 104 to 106°F., constipation and stiffness.

A therapy which is quite effective is pituitary extract (anterior pituitary lobe). The dosage is 2 to 4cc subcutaneously in the mammary region.

Following that a mammary ointment should be applied to the udder sparingly and with gentle friction.

This may be repeated two or three times daily. Frequent bathing of the udder is practical and satisfies the owner that he is aiding in the recovery of the patient.

Usually milk can be squeezed from the teats within 15 minutes following the administration of pituitary extract. The pigs can then satisfy their hunger.

Occasionally obstinate cases present themselves and artificial feeding of the young is necessitated for two or three days.

Again, as a sequel, constipation may require attention. If so, linseed oil in 8 to 12 ounce doses is good as a remedial agent. Mineral oil is just as effectual in larger doses.

Hence, though 80% of the cases require only 15 minutes to treat, the odd one will require two or three days before anorexia and general minor symptoms have been overcome.—W. B. Durrell, *Can. Jnl. Comp. Med.* (June).

* * * *

In the tropics insects cause more discomfort, disease and death than all the wild animals and venomous reptiles which travelers dread. Flies, mosquitoes, ticks, chiggers, fleas and all the voracious hordes which feed upon man and his food thrive with special vigor in hot climates.

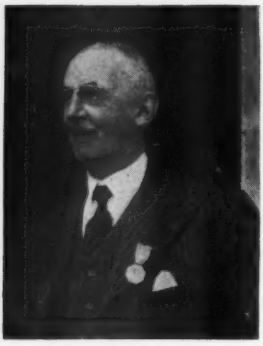
* * * *

Sex Among Lower Animals Predetermined

Commenting on recent statements of John W. Gowen and Ronald H. Nelson that "in the sense of establishing means for sex control through specific agencies under man's guidance, the problem of the predetermination of sex may be said to be solved," *The Journal of the American Medical Association* observes in an editorial in its January 30 issue that "This startling discovery does not of course signify that it will be possible in the foreseeable future for parents to choose in advance the sex of their children. But it does establish for the first time on a scientific basis the fact that this can be done experimentally among lower animals by man devised methods."

The work on which the sex differentiation statement was based concerned investigations in which the sex of the offspring of a species of fly known as Drisophila melanogaster was completely controlled so that 100% males or 100% females could be produced at will. A report on some of these studies was published recently in *Science*.

Professor Wooldridge Retires



PROF. GEORGE H. WOOLDRIDGE

The *Veterinary Record* for July 24, 1943 contains an announcement of the retirement of Prof. George H. Wooldridge from the faculty of the Royal Veterinary College (London) with which he had been connected since 1908.

Professor Wooldridge is known to many American veterinarians since he attended the 12th International Veterinary Congress in New York in 1934 and after the congress visited various American and Canadian cities. He has been a prominent figure at international veterinary gatherings for a third of a century and in his home land has influenced the trend of veterinary progress to a degree attained by few, if any, others. He was president of the National Veterinary Medical Association of Great Britain and Ireland in 1926 and of the Royal College of Veterinary Surgeons in 1939.

A prolific writer on veterinary subjects throughout his long and brilliant professional career, Professor Wooldridge was joint editor of the *Veterinary Journal* for eight years and collaborated in writing various veterinary works—his most notable work is the 2nd edition (2 Vol.) 1935, of Encyclopædia of Veterinary Medicine, Surgery and Obstetrics, of which he was editor. Because of his valuable observations and contributions to veterinary literature he was awarded the Steele Memorial Medal by the Royal College of Veterinary Surgeons and the Victory Medal by the Central Veterinary Society.

Vitamins Increased by Germination

Tests of dormant and sprouted seeds of various cereals including oats, wheat, barley and corn show that the vitamin content including riboflavin, niacin, biotin, pantothenic acid, puridoxine, folic acid, inositol and thiamine is increased from three to 14 fold by sprouting. There is therefore a sound nutritional basis for the common practice of sprouting oats and other grains for poultry feed and also for the common consumption of sprouted grains by peoples of the Far East.

In several varieties of soybeans studied it was found[1] that the thiamin and pyridoxine content was somewhat less than twice as high in the mature as in the green bean. Just the opposite occurred with regard to the riboflavin and the niacin content—it was nearly and sometimes more than twice as high in the green as in the mature bean. The pantothen and biotin varied little whether the bean was mature or green, but ascorbic acid occurred only in the green bean. The thiamin content of mature soybean is more than four times that of the round of beef.

Save Feed by Saving Pigs

Indicative of the importance of saving every possible pig or hog to market age are the figures released by the U. S. Department of Agriculture. For example: Every pig farrowed dead means the loss of 140 pounds of feed, while for each pig farrowed alive but dying at weaning time (about 10 weeks) there are lost 120 pounds more of feed; and for every pig dying eight weeks after being weaned 100 additional pounds are lost. During the next 8-week period of its life, feed consumption amounts to 242 pounds. And the final fattening period of eight weeks, requires about 388 additional pounds of feed —making a total of 990 pounds of feed for each hog when finished ready for market. If the hog dies of hog cholera, for instance, just before it is ready for slaughter, nearly ½ ton of feed is lost.

[1] Burkholder, Paul R., 1943. Vitamins in edible soybeans. *Science*, 98, pp. 188-190.

Development of Blood Transfusion

Blood transfusion[1] was first employed in 1665. It quickly became a fad but the percentage of fatal outcome was so high that it soon fell into disuse and was prohibited by law in some countries. In 1818 James Blundell, a London obstetrician, rediscovered blood transfusion and its employment as a therapeutic measure gradually increased, but it was not until the research of Landsteiner, in 1900, on blood groups that the measure was put on a sound basis. Even then the tremendous possibilities of blood transfusion were not realized until World War II. The most common and important emergencies are those arising from shock, hemorrhage and burns and it is in these fields that transfusion is preëminent. Such casualties are of course common in the military service and it is to military medicine that most of the advancement in this field is due.

Stored blood or "blood banks" were developed in Russia as a result of studies begun in 1928 and were given a tremendous impetus by the outbreak of the present war.

Captain Gordon, a medical officer in the British Army was the first (1918) to urge the use of blood plasma for transfusion. Hartman in the same year reported the use of plasma intravenously without regard to blood group or compatibility. Plasma transfusion combats shock by controlling several important pathologic changes, including hypoproteinemia, hypotension and hemoconcentration.

Interest in the use of blood plasma lagged until the outbreak of World War II in 1939. Whole blood transfusion is not employed in the military service now, except in gross hemorrhage where there is serious depletion of the red cells. Recently[2] red cell transfusions have been used in the treatment of anemia—thus utilizing the red corpuscles, which had heretofore been discarded when plasma was produced.

Veterinarians in the army, like the military medical service, led the profession in the use of plasma in animals; the first reported use being in the 30th Veterinary General Hospital in 1941.[3] However, going further than their medical confreres they prepared their own plasma, both liquid and dried forms, in the field where it was used, without a laboratory building and with a minimum of laboratory equipment. Even at that time (1941) a considerable percentage of blood plasma manufactured for human use in elaborately equipped and staffed laboratories was found on test to be toxic and had to be discarded. No batch of plasma prepared in the veterinary hospital proved to be toxic or unusable.

[1]Blood transfusion—then and now. *Vet. Med.*, 36:11, (Nov., 1941) pp. 548-549.

[2]A use for red blood cells. *Vet. Med.* (June), 38:6, p. 203.

[3]Utterback, John A., 1942. Chemical aspects of plasma therapy in veterinary medicine. *Vet. Med.*, 37:5, pp. 207-209.

In Great Britain imported wools and hides are required to be disinfected at the port of entry. The United States does not have such requirements and during the present war an increasing quantity of wool has been diverted to America and anthrax from this source has shown a sharp increase.

Hog-Cholera Serum Output Breaks Previous Records

Anti-hog cholera serum is now being made in record-breaking quantities. Production by establishments operating under Federal licenses show that more than 1,700,000,000cc of the protective serum was made during the period July 1, 1942, to June 30, 1943. This quantity is about 25% above last year's high output and greatly exceeds all previous production records.

Under the Federal Virus-Serum Toxin Law, veterinary biological products intended for interstate commerce must be prepared in establishments licensed and inspected by the Department. This supervision now covers more than 99% of the total production of anti-hog cholera serum.

Officials of the Bureau of Animal Industry view the current unprecedented output of serum as a distinct national asset, as it represents large-scale protection of the vast number of hogs now being raised in the United States against the most formidable swine disease.

About 10 years ago, Otto Gray of Stillwater, Oklahoma, started a herd of midget cattle from one Angus midget. This cow raised four calves from ordinary Hereford and Jersey males. All bred true to the midget type. The first calf (now about eight years old) raised several calves, all midgets, when bred to Herefords or Jerseys. There are now many midgets in the herd, including the fourth generation. Two cows, one of the second and the other of the third generations, each gives five gallons of milk a day that is high in butterfat content

One hundred years ago the average dairy cow produced 2,360 pounds of milk annually and the record yearly production of one cow in 1850 was 12,000 pounds. In 1939 the average production per cow was 4,538 pounds and the record for one cow was 38,000 pounds. The average annual butterfat production per cow a hundred years ago was 90 pounds. Now it is double that amount, with a record of 1,400 pounds for one cow.

Certified Milk for New York to Be Pasteurized

The New York City Board of Health has issued a regulation restricting the sale of certified raw milk and certified raw milk products to persons presenting a doctor's prescription for such products.

About 24,000 quarts of certified milk are distributed daily in New York City. Of this milk only about 4,000 quarts has been pasteurized. Detroit and Cincinnati require the pasteurization of all certified milk sold in those cities. In Boston, in the absence of regulations requiring it, 70% of the certified milk is pasteurized.

There are over 600,000 dairy farmers and 26 million dairy cows in the United States. The hourly production exceeds seven million quarts of milk.

Vaccination against bovine brucellosis is widely encouraged in California under a plan supervised by the university. A survey is made by the county agent and a schedule for vaccinating arranged in cooperation with the veterinarians practicing in the county. The vaccine is administered by the veterinarians at a flat price of 55 cents per animal.

Figures from the Holstein Association of America indicate that type and production seem to go hand in hand when a large number of animals are studied. The records of 6440 classified cows in a recent study were adjusted to a mature, 365-day, 3 times-a-day milking basis. The 261 cows that rated "excellent" in type had an average production of 17,215 pounds of milk and 601.4 pounds of fat, whereas the 25 that were "poor" averaged 12,612 pounds of milk and 430.7 pounds of fat.—*Country Gentleman.*

Recommendations are made[1] that sodium bicarbonate should be prescribed whenever sulfadiazine is administered since it has been found, through experiments, that alkali treatment sufficient to maintain the urine neutral or slightly acid, acts as a preventative of kidney damage and obstruction of the urinary tract.

Meat Substitute

Soybeans are a good meat substitute as they contain 10 times as much fat as ordinary household beans. Carver, of the Washington Experiment Station, recently said, that their work with poultry has consistently shown better results from soybean oil meal than from meat meal, however, these results were obtained when a portion of the protein was supplied by a good grade of fish meal.

The Office of Civilian Defense recommends a more cautious use of the sulfa drugs in wounds of civilians. The danger of injurious effects from sulfa drug treatment is greater among civilian injured because persons of all ages and stages of health comprise this group, whereas the military wounded are in a select group of healthy young men. Sulfa drugs are not advised for first aid but once in the hospital, they can be used under medical supervision with proper precautions.—*Science.*

A new hay has been developed at Cornell which may be of inestimable value to horsemen after the war when it can be produced in quantity. A mixture of the large Ladino clover from Italy and a pasture orchard grass known as S-143 is allowed to grow to about five inches in height and is then cut with a lespedeza bar. It is gathered immediately, placed in large tin trays, and sent through a dehydrating plant. The plant blows hot air through the grass, takes out all the moisture, and the grass comes out still green. It has been found to be remarkably high in protein. There are several all-grass farms around Philadelphia which are trying this mixture and their results have been excellent.—*The Blood Horse.*

[1] *Jul. A. M. A.*, Aug. 19, 1943.

Death from Severe Burns

It is reported by the University of Minnesota and the Anderson Institute of Biological Research, that deaths caused by severe burns may be due to the formation of protein clots (emboli) in the capillaries. These clots are apparently a fine precipitate of fibrinogen. It is known that when plasma is brought to a temperature of 131 to 145° F., for several minutes (the same temperature which has been found to prevail for several minutes in severe scalds) there is also such a precipitate of fibrinogen.

Blood serum and plasma, which have been heated therefore do not contain this toxic substance. The benefit secured by plasma transfusion in cases of severe burns may be partially due to the fact that the fibrinogen has been removed.

Burns Treated by Paper Tissue

An infected (or uninfected) burn treated by free cleansing with soapy sterile water, debrided, dried, covered directly by cod liver oil ointment and this covered by a single layer of paper tissue and redressed daily, then less frequently as required, and kept in daily motion, will heal in a minimum of time with a minimum of pain and scar formation without contracture. Good surgical measures must be used. Blebs are left intact unless they break in cleansing, as then less open wound is present and less tender surface is exposed. Serum under a clean bleb does not become infected, it acts as a cushion conducive to healing, and is reabsorbed or spills harmlessly if its covering is kept clean. This covering is nonadherent, completely flexible and allows a free film of normal fluid beneath it; elevation of the burned part and daily motion prevent and minimize stasis as well as act as a prophylactic toward circulatory accidents, thrombi or emboli. Non adherence and motion permit granulation or epithelization across the affected area that will not require stretching or breaking in subsequent therapy. The paper tissues packed in their usual store shelf manner are safe to use although the author autoclaves them.—Callahan, *Illinois Medical Journal* (Nov. 1942).

Typical attitude of animals affected with colic which is the primary cause for losses of horses and mules in Puerto Rico

Animal Industry in Puerto Rico

LARGE dairy enterprises are profitable in the southwestern coast section of Puerto Rico.[42] In this locality the larger the establishment of dairy cattle the higher is the gain per animal. On farms with an average of 3.02 animal units the profits average about 46 cents—on a 16 unit farm they reach $7.16. This difference is at least largely accounted for by the fact that in the larger group the cost per unit was 7% lower while the income was 8% higher. Another factor affecting the profit was that in the larger units the labor cost was reduced about 72%.

In this same section of the island the milk production per cow averages 931 quarts, in the tobacco area it is 675 quarts. However, in the coast area where much more milk is produced the price per quart of milk is one cent lower than in the tobacco area.

In the tobacco region (which is practically in the center of the island and farther in on the southwestern coast) the larger the herd the smaller the profit. Farms having 2.6 dairy units make $7.41 while those averaging 11.57 units make only $2.22 profit per unit.

In experimental studies with calves the nodular worm, *Oesophagostomum radiatum*, has been found to be capable of producing a serious gastrointestinal disturbance, characterized by severe diarrhea, anorexia, weakness, anemia and emaciation.

During the fiscal year hogs of the best American breeds have been imported with the idea in mind that in cross-breeding of the native stock with Duroc-Jersey or Hampshire, and selection, the result may combine the desirable characteristics of all three types.

Flatulent colic has been a serious ailment in horses in Puerto Rico in recent years, resulting in many deaths. It has been thought to be associated with infestation with internal parasites and an investigation has been made in order to ascertain if there is such a relationship.

No relationship was found between infestation with intestinal parasites and the occurrence of colic. However, one typical outbreak was studied in which the majority of the horses died of the disease, and the organism *Clostridium botulinum* Type A was isolated from the grass and molasses water mixture fed to these horses. Grass at the scene of two other outbreaks was found to be contaminated with a similar if not identical organism. Since naturally acquired cases of typical flatulent colic occurred after the horses had eaten grass from a wet, swampy pasture, and since the botulinus organism grows in such places where partially anaerobic conditions exist, the feeding of grass from such lands, especially if mixed with molasses water which increases the potency of the toxin produced by the organisms, should not be permitted.

[42] Excerpts from Report, *Puerto Rico Agricultural Experiment Station.*

Wartime Feeding of Swine

By B. W. FAIRBANKS
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THE problems associated with the wartime feeding of swine are due to (1) a protein supply that does not satisfy the demand, (2) an available supply of plant protein supplements which is abnormally larger than the available supply of animal proteins and (3) a threatening shortage of carbonaceous concentrates.

In attempting to extend the short protein supplies in the aggregate, some concessions to a most rapid and a most economical pork production may have to be made, but it is hoped and expected that a net profit may still be realized.

During this present summer, make use of as much pasture as possible. Pastures, particularly legumes, will reduce the protein requirements per unit of gain from one-third to one-half, depending on the weight of the growing-fattening pigs.

Another fall and winter are coming, and another drylot feeding period with insufficient high-protein feed ingredients is anticipated. High-quality bright-green suncured legume hay put up this summer and "ear-marked" for the hogs next winter will extend the protein supplies. Legume hay along with grain, a vegetable protein supplement and minerals before the pregnant sows and gilts at all times make for an adequate nutrition. Legume meals may make up at least 10% of the growing-fattening rations. The legumes add to the rations not only proteins but also the water-soluble vitamins which experimental facts show to be so essential.

Available supplies of high-protein feed ingredients may be spread further over feeding operations if less than the recommended amounts of protein are fed at certain non-critical periods. Such feeding is probably not the most efficient, but it is expedient under existing conditions, and should still net a profit. Growing-fattening hogs over 180 pounds in the drylot should make pork fairly economically on corn, alfalfa meal and minerals. When hogs are on pasture, the protein supplements might be removed from the ration at 120 pounds. These somewhat extreme recommendations are made only in the interest of protein feed conservation.

There are critical times in swine feeding when the proteins should not be spared either as to quantity or quality. Such critical periods are lactation, the early stages of the growing-fattening period, and the last third of the gestation period. If corners must be cut in feeding, they should be cut in the non-critical periods.

The second problem in wartime feeding of swine is due to the larger amount of vegetable protein supplements available as compared to the animal protein supplements. The decrease in the supply of the latter is due to a reduction in shipping from South American ports, curtailment of fishing in domestic coastal waters and a diversion of milk products from animal to human utilization.

The swine feeder of America is accustomed to feed rations relatively high in animal proteins such as meat, fish and milk. There was some apprehension when the present-day, low animal protein formulas were considered. It may be said on sound nutritional grounds that it should be possible to produce pork on rations containing no animal proteins. This fact has been demonstrated for growing-fattening pigs from weaning to market weights on legume pasture; for growing-fattening pigs from 60 pounds to market weight in drylot, and for sows and gilts during gestation. More research should be done on feeding during the lactation period and for growing and fattening pigs in drylot immediately after weaning.

In mentioning this theoretical nutritional concept and in referring to experimental work which tends to prove its soundness, there is no intention to advocate exclusively vegetable protein rations. There are available some high-protein animal feeds; there is a possibility that the supply may be increased, and some day the relative supplies of vegetable and animal proteins may be

[2] Presented at Third Nutritional Conference for Veterinarians, Sunset Park, Decatur, Indiana, July 7, 1943.

back to normal. In so far as these animal proteins are available, they should be used, for one of the contributions which livestock feeding makes to our national economy is the utilization of feeds not suitable for human consumption. Incidentally, this is a point which seems to be ignored in some quarters. The purpose of this discussion is to assure feeders that they can get along with small quantities of animal protein if necessity demands.

To deal successfully with this wartime problem of utilizing relatively more vegetable than animal protein supplements, rations must be rebuilt around the vegetable supplements. The fundamentals of such reformulation are to increase the minerals in which vegetable proteins are seriously deficient and to increase the amounts of water-soluble vitamins in which the vegetable proteins are seriously lacking. The addition of simple mineral mixtures is well known and well understood. The farmer-feeder may augment the supply of water-soluble vitamins by making use of pastures, particularly the legumes, in summer, and by providing bright-green alfalfa hay or meal for all classes of swine in the winter.

If the situation demands further conservation of the animal protein concentrates, take them out of the rations for growing-fattening hogs when on pasture, for the heavy hogs in drylot and for sows and gilts during the gestation period. Save enough of these animal supplements to feed during lactation and at the beginning of the growing-fattening period in drylot. These are the critical periods. When the animal proteins are removed, increase the minerals and supply legume hays and meals in drylot feeding.

So far the recommendations have referred to total supplies of protein and to an abnormal relation between available animal and plant proteins. In our state the corn is doing nicely in spite of late planting, but it is not safely in the crib as yet. The spring pig crop report is out and you have seen the numbers. To say that this country may be short of corn generally, as it is short of corn locally at the present time, does not require much imagination. When this shortage becomes apparent, the finger is going to be pointed at the swine industry, as the corn requirements of swine exceed those of all other livestock.

In the interest of extending the corn *supply, the feeding of corn to the heavy*-weights should be discouraged. The amount of corn required by hogs weighing over 225 pounds is high. It may be argued that the Army and Navy, Lend Lease, and civilian population need the extra pounds of pork and lard on the heavyweight hogs. The need for the additional pounds of pork is unquestioned but the additional weight on a hog over 225 pounds is attained by an increased deposition of lard in relation to the pork. Judging from the amount of fat left on swine carcasses, we are not short of fats and oils. This country is and will be short of corn; corn and lots of it is needed to put those extra pounds of lard on a hog over 225 pounds.

The feeding of a well-balanced ration is a sound practice in peacetime or wartime, and it is a prime necessity in spreading out a dwindling corn pile to feed a livestock population which on January 1, 1943, stood at an all-time high. The feeding of protein supplements reduces the requirements of corn for the production of a unit of gain. The feeding of corn alone is a waste.

Artificial Insemination and Disease Control*

By N. J. SCORGIE, M.A., B.Sc., M.R.C.V.S.
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SINCE in the modern technic of artificial insemination there is no actual contact between the male and the female, the danger of disseminating certain contagious diseases, usually spread by coitus, is eliminated. In this group of diseases are trichomoniasis, infectious vaginitis and possibly contagious abortion and corynebacterial metritis—all diseases which occur in Great Britain.

The hazard of the bull acting as a disseminator of genital disease applies within a herd, but it is unquestionably greater where communal or inter-herd sires are operating. In the case of bulls which are to be used by co-operative artificial breeding societies a stringent veterinary examination of the animals will be necessary to ensure that they were free from transmissible genital diseases.

As an example of the use of artificial insemination for disease control within a herd, the case of trichomoniasis may be cited. Here, if the disease is well established, it is almost certain that the bull will harbor the infection. In the bull, treatment of trichomoniasis is likely to be protracted and during this time the bull is unfit for service. In order to permit the resumption of breeding operations, it will be necessary to use a clean bull; but since it is usually difficult to say *with certainty* that any particular cow after appropriate treatment is free from infection, the risks of transmitting the infection to the clean bull are obvious. In such a case, the adoption of artificial breeding for a time will ensure that the clean bull is protected from exposure to infection, and by so doing, the continued dissemination of the disease in the herd will cease.

Artificial insemination may also be utilized to overcome difficulties in breeding caused by deformities and abnormalities in the genital tract of the cow, *e.g.*, occlusion or induration of the cervix. I wish to cite an example to show that artificial insemination does have an application of some value in this type of sterility (Scorgie, 1942).

A very valuable pedigree cow, after her fifth calf, was served 16 times by the natural method over a period of 654 days without conception resulting. Heat periods were normal. The cow had been subjected to uterine irrigation on several occasions and had also received hormone treatment. At this stage I saw the cow, and on examination she appeared to me to have a partial occlusion of the os cervix, through which the annular rugae of the cervical canal were protruding. In view of her previous history I, not very hopefully, suggested artificial insemination. The cow held to the first insemination and produced a full-term calf. One or two other cases of a similar type have also been successfully bred by artificial means, but, on the other hand, it must be acknowledged that in a fairly large number of instances artificial insemination has been no more successful than natural breeding. Nevertheless, with a valuable cow which fails to breed after repeated services and in the absence of any very obvious disease or abnormality, it does seem to me that artificial insemination should be tried before sending the animal for slaughter.

Finally, the cause of low breeding efficiency in a herd may be due to the use of a bull of low fertility. It is not possible to say with what frequency this occurs, but experience indicates that it may be more common than is usually suspected. Thus, for example, it has been found that a bull may cease to produce spermatozoa of good quality and becomes, therefore, incapable of getting cows in calf. In most cases this form of sterility is of a temporary nature, and under rest and treatment normal reproductive function will return. Usually, before the bull has been suspected a number of cows may have been served without their conceiving, thereby causing a not inconsiderable disturbance in the owner's breeding program. The reason for this temporary stoppage in the production of good quality sperm is unknown, but the

*Reprinted from *Veterinary Record*, 55:5, pp. 57-58.

majority of cases we have met with have occurred during the months of January to March. It has been suggested that it is related to some deficiency in the diet, possibly vitamin C (Phillips, 1940). With the co-operation of a number of practitioners I have been carrying out a trial of the therapeutic value of injections of ascorbic acid in suitable cases of sterility in bulls, and in one or two instances treatment has caused an apparent recovery in the bulls' breeding capabilities. Our series of cases is as yet, however, too small to make any final comment on the value of this form of treatment (Scorgie, 1942).

I am not, of course, suggesting that artificial insemination is a remedy for sterility in the bull, but as soon as the bull becomes suspect, no time should be lost in having his semen examined. The only way to obtain a satisfactory sample of semen for this purpose is by means of the artificial vagina, which is normally used for collecting semen for artificial insemination. By submitting the semen so obtained to certain diagnostic tests it is sometimes possible, but not always, to say with certitude that the semen of the bull in such a case is of low quality.

I want to make it clear that I am not advancing artificial insemination as a remedy for all the reproductive disorders of cattle. This is far from being the case, and its indiscriminate use for this purpose could only bring the practice into disrepute. When it is used *rationally and in conjunction with expert diagnosis,* artificial insemination can play an important role in the control of certain well-defined reproductive diseases of cattle. For this reason, it is my firm conviction that its use under large scale field conditions should be in the hands of the veterinary surgeon.

Possibility of Sex Control.—I would like to end this section dealing with the "Uses of Artificial Insemination" on a speculative note. This concerns the artificial determination of sex by the separation of the male and female-determining sperm. Such a possibility has been, and still is, a favorite theme of all kinds of chicanery and pseudoscience. Some recent work, particularly in U.S.S.R., indicates a serious possibility that the problem may be solved by the method of electrophoresis, *i.e.,* the passage of an electric current through a suspension of sperm, causing an accumulation of the male-determining sperm at the cathode and the female-determining sperm at the anode. There are still many technical details of the process to be worked out, but it would be a bold man who denied the possibility of a solution of the problem within the next 10 or 20 years. The importance of such a discovery for the dairy and poultry industries would be profound.

The Physiological Approach to the Treatment of Diarrhea

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YEARS ago Hippocrates defined diarrhea as an abnormal frequency and liquidity of fecal discharges. The definition still holds; however, the treatment of diarrhea has undergone many changes with the passing years. The changes in the method of treatment have been the natural outcome of our gradual acquisition of a greater knowledge of the physiology of the gastrointestinal tract combined with a better understanding of the etiologic factors involved. A brief resume of the physiology of the gastrointestinal tract is a fitting introduction to the statements which are to follow.

Physiology of the Gastrointestinal tract.—Food is taken into the stomach as liquids and solids and becomes further liquefied by gastric movements and the enzymic and chemical actions of the gastric juices. It is gradually assimilated as it passes, by a complicated mechanism of propulsive and segmental peristalsis, over the villous absorptive surface of the small intestine. Finally, still as a liquid, the residue is poured into the cecum and the right colon. The colonic function is a combination of dehydration and expulsion. The mass is partly dehydrated in the ascending and transverse colon. In the descending and sigmoid colon, dehydration continues until a formed, compact fecal mass results. When the mass reaches a sufficient bulk it passes into the rectum and is extruded by rectal contraction and anal relaxation.

It is evident from these facts that if passage of the fecal material through the colon is too rapid, insufficient time for dehydration is allowed and the stool will be watery. On the other hand, if passage is too slow, excessive dehydration will occur and a hard, dry stool will result. If the stool is of the "consistency of a ripe banana" the bowel is functioning properly whether there is a bowel movement once a day, several times a day, or once in two or three days.

Various types of therapy have been used in the treatment of diarrhea. Purging, narcotizing by opium and opium derivatives, and the administration of starvation diets all have their advocates, However, with the present advances in our knowledge of this condition it is now felt by the author that these methods of treatment are useful merely as supplementary therapy or in the treatment of a limited number of certain types of diarrheas.

Purging as Treatment of Diarrhea.—The administration of cathartics to evacuate the entire contents of the gut followed by narcotizing to check the diarrhea was for a long time thought to be an effective method of treating diarrhea. As a matter of fact the rationale undoubtedly may still be good in some cases. However, this method has been more or less abandoned as routine treatment for every case of diarrhea.

Dr. Manfred Kraemer,[1] Chief, Gastrointestinal Clinic, Newark Presbyterian Hospital, Newark, New Jersey, has this to say concerning the use of laxatives in the treatment of diarrhea: "Although recommended in textbooks, I do not believe that castor oil or saline laxatives have any place in the treatment of dietary or any other type of diarrhea. The digestive tract is doing its best to evacuate the offending foodstuff or poisoning. To further whip it up in its already irritated state is adding insult to injury."

This writer agrees heartily with the above statement, especially in regards to treatment of diarrhea in dogs and cats. Without a doubt many cases of intoxication and its resulting dehydration has been brought about by the injudicious use of cathartics in diarrheas of small animals. The epithelial cells lining the villae of the small intestines are sick tissues during an attack of diarrhea and by giving a harsh cathartic these cells are wiped out resulting in a denuded surface and free absorption of intestinal toxins which is apparent in the patient as dehydration, malaise and very highly injected mucous membranes.

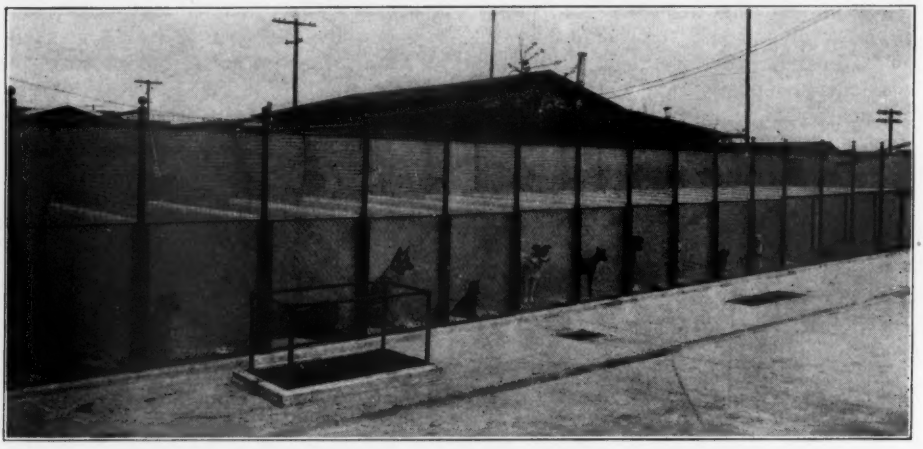
Narcosis in Treatment of Diarrhea.—

Morphine and opium when given in therapeutic doses cause a variety of effects on the alimentary canal. Most observers agree that they relieve unpleasant cramping so often associated with diarrhea. More important, however, is the fact that these drugs cause a delay in the passage of the fecal contents through the alimentary canal. Presumably this delay is chiefly caused by contraction of the pyloric and the ilio-colic sphincters.

It is well established that opium is effective in stopping diarrhea. However, diarrhea is a symptom and not a cause of a disease and therefore opium must be used with care as it may retard the elimination of toxic products to the detriment of the patient. Any delay in the removal of these substances may increase their absorption into the body. Furthermore, the prevention of their elimination may superimpose an inflammatory reaction on an already irrigated gut. Thus opium and its derivatives have a limited value in the treatment of diarrhea.

Starvation Diets.—In general it may be said that the old notion of starving a protracted diarrhea or reducing the food intake in the treatment of this condition is unnecessary and usually contraindicated. Although on the first day of a digestive upset or an acute gastroenteritis the diet should be reduced, it must be liberal in all severe and protracted diarrheas in order to prevent a depletion of fluid and to minimize loss of weight and strength.

Causes of Diarrhea.—Diarrhea may be caused by infections of parasitic agents or may result from noninfectious conditions.



Eighteen dogs suffering from enteric distemper were treated. There was complete recovery in all but one, a young cocker spaniel which developed encephalitis and was destroyed at owner's request

This latter group includes the functional diarrheas and those diarrheas not caused by micro-organisms or parasites. In both the infectious and the noninfectious types the presence of irritants is responsible for the condition. In the infectious type the irritants are derived from bacteria or their toxins; in the noninfectious group, from food and other sources. In the noninfectious group harmful bacteria may be associated with the diarrhea but is not necessarily the specific etiologic agent.

Treatment of Diarrhea.—Diarrhea is a symptom of some underlying disturbance, and it is important in treatment to remove the causative agent or agents—pathogenic bacteria, toxins or irritants—by employing some substance possessing the ability to counteract them. The author has found that a kaolin-pectin product[2] possesses properties which make it useful in removing and counteracting these harmful agents. Kaolin may be regarded as a non-absorbable adsorbent that effectively removes the bacteria and irritants that cause diarrhea. It exerts its beneficial action largely by its ability to adsorb bacteria, toxins, and irritants. Later these adsorbed products are removed from the gut with the feces. Kaolin,

by virue of the same physical property, adheres to the intestinal mucosa, forming a protective coating. Because of this latter effect kaolin is one of the most effective of all intestinal adsorbents in reducing the rate of passage of intestinal contents through the gut.[3]

Pectin should be incorporated in the formula primarily to keep the kaolin suspended, thus giving more adsorptive surface available for contact with bacteria and toxins. However, many properties have been ascribed to pectin which undoubtedly contribute to the beneficial therapeutic action of the preparation in the treatment of diarrhea. Of these the following are worthy of mention: (1) pectin adsorbs toxins and bacteria from the gastrointestinal tract; (2) pectin is a source of galaturonic acid which, according to Manville, et al.,[4] is capable of conjugating with toxic materials; and, finally, (3) pectin is soothing and protective to inflamed and ulcerated gastrointestinal mucosa.

Sulfonamide Therapy.—Over the years many substances have been tried and are now discarded. However, recent studies indicate that some of the sulfonamide drugs are truly effective as antiseptics in the treatment of infectious diarrheas. Anderson[5] and others showed that sulfathiazole is useful in the treatment of both infectious and noninfectious diarrhea. The good results obtained made the author suggest that there may often be an infectious basis for the so-called noninfectious diarrheas. Sulfaguanidine has also been shown useful in the treatment of infectious diarrheas. Poth and Knotts[6] have reported the use of succinylsulfathiazole in various intestinal infections. These observations are sufficiently encouraging that more ivestigations are indicated in order to determine the best means of using these drugs in the treatment of diarrhea.

Sulfa Drugs Used with Kaolin-Pectin Preparations.—Combining the bacteriostatic properties of sulfa drugs with the adsorptive and demulcent actions of a kaolin-pectin preparation probably provides effective chemotherapy for diarrhea, especially the type caused by severe infections, as in enteric distemper. The writer undertook to determine its effectiveness in small animals suffering with enteric distemper. A total of 18 dogs were studied. The kaolin-pectin preparation was administered in doses of one to two ounces at three-hour intervals. Sulfathiazole in doses of 20 to 60 grains daily (divided into four doses) was administered. This combination was well tolerated and no toxic symptoms were apparent. The average duration of administration was 4.5 days with extremes of two and eight days. Complete recovery from enteric symptoms was accomplished in all but one animal, a cocker spaniel puppy, aged six months, which developed encephalitis and was destroyed at the owner's request. Equally good results were obtained in another group of 11 cases of so-called noninfectious diarrhea.

Summary.—It is felt a rational approach in the treatment of diarrhea embodies the use of a collodial suspension of kaolin and pectin which, in the opinion of the writer, will afford maximum adsorptive powers for bacteria and their toxins. We advocate the use of a sulfa drug in severe infections and prefer to administer it separately between doses of the kaolin mixture. Combining the bacteriostatic properties of sulfa drugs with the adsorptive and demulcent action of kaolin and pectin would provide effective chemotherapy for diarrhea, especially the type caused by severe infections.

References

1. Kraemer, Manfred, 1940. *Jnl. Med. Soc.* N. J. 37:533 (November).

2. Kaopectate—Product of The Upjohn Co.

3. Morrison, J. L., 1939. *Jnl. Pharm. & Exper. Therap.* 66:26 (May).

4. Manville, J. A., E. M. Bradway, and A. S. McMinis, 1937. *Can. M. A. Jnl.* 36:252 (March).

5. Anderson, E. V., 1941. *Jnl. Ped.* 18:732 (June).

6. Poth, E. J. and F. L. Knotts, 1942. *Arch. Surg.* 44:208 (February).

Removal of the Cecal Worm, *Heterakis gallinae* from Chickens by Feeding Phenothiazine in the Mash

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Introduction

THE effectiveness of phenothiazine, administered as individual treatment either in capsules or in the mash for the removal of the cecal worm (*Heterakis gallinae*) of poultry, has been demonstrated by McCulloch and Nicholson (1940), Roberts (1940), and Allen, Olivier and Peterson (1942). However, since flock treatment is the most practical method of worming birds, it is important to know the proportion of drug to mash necessary to obtain maximum results with this method. In order to obtain this information, individual birds were treated to determine the length of time necessary to consume the minimum amount of medicated mash that is required to remove the worms. The first two experiments reported in this paper were conducted for the purpose of obtaining this information. The third experiment was planned to test whether the conclusions reached as a result of experiments I and II were practical under range conditions.

Materials and Methods

Forty-four naturally infected Rhode Island Red chickens, at least 22 weeks old, were used in a series of three experiments. In all cases the phenothiazine was administered in mash regularly used for growing chickens at the U. S. Department of Agriculture Beltsville Research Center, Beltsville, Md. Feed was withheld from the birds between 4:30 p.m. of one day and either 8:30 or 9:30 a.m. of the following day, when treatment was begun. Sufficient hopper space was provided to insure that all birds could feed at once. After treatment, the birds were fed regular, unmedicated mash, held for three or four days, and then autopsied. Following treatment, the birds in the first two experiments were confined in individual cages so that the droppings could be collected daily and examined for worms. The droppings were washed through three screens of 4, 16, and 40 mesh, respectively, the residues placed in glass dishes, washed by decantation, and examined against a black background. At autopsy, the cecal contents of all experimental birds were washed by decantation (not screened as done previously) and examined for worms. This method resulted in the recovery of several small, immature worms which, as shown in a previous paper (Allen, Olivier, and Peterson, 1942), are lost when droppings are screened. These were disregarded in making the final worm counts, since, in this case, the latter would not be comparable with those made after daily fecal examinations in which screens were used.

Results

Experiment No. 1 (See Table I).—The first experiment, involving 12 male chickens, was designed to determine the efficacy in removing cecal worms of a phenothiazine-mash mixture fed over a short period. Nine birds were allowed access for one hour to a mixture consisting of 540gm of mash and 9gm of phenothiazine. The calculated average intake of the drug per bird was slightly more than 0.4gm. On the fourth day after treatment the birds were autopsied. Although a large number of worms were removed by this treatment, the average efficacy was only 57%. Two of the treated birds retained a large proportion of their worms after treatment, possibly because they consumed only small amounts of the medicated mash. The control birds lost 3.7% of their worms during the course of the experiment.

Experiment No. 2 (See Table II).—The second experiment, which involved 10 chickens, was designed to determine the efficacy of phenothiazine-mash mixtures when fed over a longer period of time than in experiment I. The birds were held in isolated units of a

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laying battery and treated as follows: Each of three birds was given 75gm of mash to which 0.5gm of phenothiazine had been added, while each of five others was given 75gm of mash to which 1.0gm of phenothiazine had been added. Each of two control birds received 75gm of unmedicated mash. In all cases the mash was left before the birds for 7½ hours, during which time the calculated average intake of phenothiazine per bird ranged from 0.46 to 0.91gm. Six hundred and fifty-four worms were eliminated from the treated birds over a three-day period following treatment, whereas one worm was recovered at autopsy. Only one worm was recovered from the droppings of the control birds but 166 were recovered at autopsy. In this experiment, therefore, 0.46 to 0.91gm of phenothiazine per bird removed most of the cecal worms from infected chickens.

TABLE I—RESULTS OF GROUP FEEDING OF PHENOTHIAZINE IN MASH TO CHICKENS FOR ONE HOUR FOLLOWING A 16-HOUR FAST

Bird Number	Change in Weight (Ounces)	Worms Expelled on Successive Days 1	2	3	Total Worms Expelled	Worms Recovered at Necropsy
Treated Birds						
1189	−1	0	4	0	4	0
1201	−6	106	1	0	107	16
1623	+4	57	1	0	58	0
1629	+5	7	0	0	7	0
1908	+6	7	0	0	7	1
1911	−1	4	0	0	4	170
1943	+8	49	4	0	53	62
1986	+9	59	2	0	61	0
2367	+8	28	0	0	28	1
Total	+32				329	250
Control Birds						
1160	−3	0	0	0	0	102
1934	+6	5	2	4	11	163
1957	+4	0	0	0	0	18
Total	+7				11	283

In one of the shelters were placed 660gm of unmedicated mash. The same amount of mash to which 11gm of phenothiazine had been added was placed in two hoppers in the other shelter. Both groups of birds were allowed access to the feed for 6½ hours. The control birds consumed all of the mash but the treated birds ate only 544gm, the average consumption of phenothiazine by them being 0.81gm per bird. At autopsy, the 11 treated birds harbored 15 worms while the 11 controls harbored 1105 worms, indicating an average efficiency of approximately 98%, assuming that the levels of infection were essentially the same in the two groups of birds. This appears to be a reasonable assumption since the 22 birds used in this experiment were selected at random from the group used for selecting the birds of Experiments Nos. 1 and 2. In addition, an examination of the data (by analysis of variance) from these two experiments showed that the difference in the average number of worms per bird in the first and second experiments was not significant.

TABLE II—RESULTS OF FEEDING PHENOTHIAZINE IN MASH TO ISOLATED CHICKENS FOR 7½ HOURS FOLLOWING A FAST OF 16 HOURS

Bird Number	Change in Weight (Ounces)	Amt. of Drug 75 Grams of Mash (Grams)	Calculated Drug Intake (Grams)	Worms Expelled on Successive Days 1	2	3	Total Worms Expelled	Worms Recovered at Necropsy
Treated Birds								
1917	+3	0.5	0.46	7	0	0	7	0
1969	+4	0.5	0.46	91	2	0	93	0
1993	+2	0.5	0.46	25	9	0	34	1
1238	+2	1.0	0.84	223	14	0	237	0
1245	+2	1.0	0.86	43	0	0	43	0
1628	+4	1.0	0.82	11	1	0	12	0
1907	+3	1.0	0.91	63	1	0	64	0
1998	+11	1.0	0.62	138	24	2	164	0
Total	+31						654	1
Control Birds								
1180	0	0.0	0.00	1	0	0	1	64
1291	−5	0.0	0.00	0	0	0	0	102
Total	−5						1	166

Experiment No. 3 **(See Table III).**—Following the favorable results obtained in experiment II, a third experiment was conducted to test the use of the drug in mash under conditions similar to those usually encountered on the range. Eleven birds were confined to each of two range shelters. In two hoppers

Summary and Conclusions

1. Three experiments involving 44 adult Rhode Island Red chickens were conducted to determine the efficacy of phenothiazine for the removal of the cecal worm (*Heterakis gallinae*) when the drug was administered in the mash.

2. In a preliminary experiment, nine birds that had been fasted for 16 hours were fed medicated mash for one hour. The average intake of drug per bird was 0.4gm.

This treatment removed only 57% of the worms, possibly because the treatment period was too short to insure that all the birds consumed an effective quantity of the drug.

3. In a second experiment, eight birds were given individual treatment with medicated mash over a period of 7½ hours following a 16-hour fast. The intake per bird ranged from 0.46 to 0.91gm of phenothiazine. All but one of 655 cecal worms harbored by these birds were removed.

TABLE III—RESULTS OF GROUP FEEDING OF PHENOTHIAZINE IN MASH TO A SMALL FLOCK OF CHICKENS FOR 6½ HOURS FOLLOWING A 17-HOUR FAST

Bird Number	Weight Change (Ounces)	Worms Recovered at Necropsy
Treated Birds		
309	+4	0
310	+1	0
324	+1	0
1032	+4	0
1101	−2	0
1228	+1	0
1625	−1	0
1644	−2	1
1652	+1	14
1655	0	0
1936	−1	0
Total	+6	15
Control Birds		
335	+5	277
374	−6	25
478	0	321
1163	−1	31
1264	+3	25
1640	+2	0
1909	−1	85
1924	+4	22
1944	+1	76
2390	+3	57
2542	0	186
Total	+10	1105

4. In a third experiment, 11 birds, kept in a range shelter, were allowed access to a mixture of 660gm of mash and 11gm of phenothiazine for 6½ hours following a 17-hour fast. The average intake of phenothiazine was 0.81gm per bird. At autopsy three days later 15 worms were recovered from the treated birds. At the same time 1105 worms were recovered from 11 control birds.

5. The data show that group treatment of chickens for the removal of cecal worms by means of phenothiazine incorporated with mash is a practical procedure and that an intake of about 0.5 to 1.0gm of the drug in mash over a period of 6½ to 7½ hours removed most of the cecal worms.

6. Phenothiazine, as used in these experiments, did not affect the appearance and weight of the birds and was, therefore, apparently harmless.

Bibliography

Allen, R. W., Louis Olivier, and H. O. Peterson, 1942. The efficacy of phenothiazine for the removal of the cecal worm of chickens. *Vet. Med.* 37:10, pp. 412-415.

McCulloch, E. C., and L. G. Nicholson, 1940. Phenothiazine for the removal of *Heterakis Gallinae* from chickens. *Vet. Med.* 35:7, pp. 398-400.

Roberts, F. H. S., 1940. A preliminary note on the efficiency of phenothiazine against some poultry helminths. *Aust. Vet. Jnl.* 16, pp. 172-174.

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It is the law of life that organisms multiply up to the limits set for them by their environment and by their competitors.—*Plague on Us.*

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Fermented Mash for Trichomoniasis in Turkeys

The Missouri Experiment Station has found the feeding of a mash high in vitamin A helpful in combating trichomoniasis in turkeys. The mash which was used is started by mixing, in a metal or wooden barrel, two pounds of baker's yeast and 100 pounds of ground whole oats with enough water to form a paste having the consistency of molasses.

This mixture is kept warm and allowed to ferment overnight after which is added either five pints of highgrade cod-liver oil or one pint of fish oil containing 3,000 units of vitamin A per gram. This is fed in troughs, allowing all of the mixture that the birds will eat in 20 to 30 minutes. The poults are given this mash three or four times a day for a week or ten days—or until they show marked improvement. Some dehydrated alfalfa leaf-meal may be added to make the mash more palatable. There should not be more of this mixture fermented at a time than is required for one day's feed. The troughs should be rinsed after each feeding. This mash should not be expected to take the place of the usual starting or growing mash for turkey poults.

★ ★ ★ BUY WAR ★ ★ ★
STAMPS AND BONDS

Practical Livestock and Poultry Nutrition

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Feed Requirements of Cattle

DAIRY cattle and beef cattle vary quite widely in their feed requirements as to class as well as to age, weight, and whether or not they are on forced production for milk or for beef.

Dairy cows must be furnished sufficient nutrients in the proper combination and balance for economical milk production. Considerable thought must be given to economy, palatability, succulency, and health promoting factors of the diet as regards digestive tract condition. Only first quality hays and concentrate mixtures should be fed if the best production records are to be obtained.

As to the amount of grain concentrate mixture to be fed each dairy cow, it must be borne in mind that the different breeds as well as individual cows have different nutritive requirements for maximum milk production. The most nearly accurate rule for the concentrate feeding of the various breeds of dairy cattle is given by the Bureau of Dairy Industry, U. S. Department of Agriculture, as follows:

Holsteins: feed 0.4 pounds of concentrate for each pound of milk above a yield of 16 pounds.

Ayreshires and Brown Swiss: feed .45 pounds of concentrate for each pound of milk above a yield of 14 pounds.

Guernseys: feed .455 pounds of concentrate for each pound of milk above a yield of 12 pounds.

Jerseys: feed 0.6 pounds of concentrate for each pound of milk above a yield of 10 pounds.

The concentrate mixture may be highly complex and carry a great variety or it may be relatively simple, containing only a few ingredients built around home grown grains supplemented with protein, mineral and vitamin concentrates. When legume hay, such as alfalfa and lespedeza, is fed straight or, as quite a few dairymen prefer to feed them, mixed with other good hays, the amount of protein supplement such as soybean meal, cottonseed meal, linseed meal, tankage or meat scraps, may be cut down in amount because of the high protein content of the legume hay. When silage is fed (as is widely done) either as the only roughage or in combination with various kinds of hay, it is well to look to the mineral adequacy of the diet. Silage adds succulency to the diet and is very satisfactory but must be supplemented with grain and high protein containing feeds and minerals to balance the ration.

A Brown Swiss does not require as much concentrate for equivalent milk production as a Jersey

The percentage of protein that should be supplied in a concentrate mixture will vary directly with the protein content of the other ingredients of the total feed allowance, particularly the hays. A figurative analysis should be made of each ration and sufficient protein supplement incorporated to bring the nutritive ratio to approximately one part of protein to seven parts of other digestible nutrients.

The feed requirements of beef cattle vary from the same natural factors as they do for dairy cattle, except that milk production is not taken into consideration except at calving time. Young growing beef cattle require a greater amount of protein (consequently a narrower nutritive ratio) than do mature cattle, simply because the young cattle are still building considerable tissue in the developing process which requires large amounts of protein. Also, their requirement for the essential minerals and vitamins is greater. The amount of protein

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supplements such as soybean oil meal, cottonseed oil meal, linseed oil meal, tankage and meat scraps, that should be fed varies directly with the amount of high protein containing roughages and the kinds of grain fed in order to provide a ration having a nutritive ratio of not wider than

cattle to fatten quickly and efficiently, the fattening concentrates and the total digestible nutrients of the ration must be relatively high. The following factor is commonly used to estimate the amount of grain necessary to produce a well finished, fat carcass in the shortest period of time. It is

The feed requirements of beef cattle differ from those of dairy cattle. The young beef cattle, however, need larger amounts of protein, essential minerals and vitamins than does the mature animal

1:6.5 for fattening calves during the initial and intermediate stage of the fattening operation and 1:7.3 for the finishing period. For yearlings, 1:6.5 in the starting and developing period, 1:7 in the intermediate period and 1:7.5 in the finishing period. For the mature cattle, two years old and up, a nutritive ratio of not wider than 1:7 in the first stage of feeding, 1:7.5 for the intermediate stage, and 1:8 in the fattening period is suggested. If the ratio is not kept approximately within these limits, more feed will be required per hundred pounds of gain and gains will be, on the average, considerably less rapid than if the proper protein balance is maintained. Another important point to consider in this connection is that cattle fed on rations deficient in protein usually carry an inferior finish and, at market time, sell at a lower price per pound.

The requirement for heat and energy producing elements, i.e., carbohydrates and fat, varies with the age of the cattle, their weight, the season of the year and the feeding program. These elements are ordinarily derived from grains—corn, barley, wheat, oats, etc., as well as from the various kinds of feeding molasses. In order for

applicable for feeding the various classes of beef cattle. This factor is 2 to 2½% of the live weight of the animals at the midpoint of their feeding period, which on a 150-day feeding period, would be the 75th day. A conservative average daily gain is considered and the estimated amount of corn or other grain arrived at in the following manner. For example, an 800 pound feeder steer estimated to gain 2.4 pounds per day and to be on feed for 150 days would at the 75th day weigh 980 pounds. Provided his ration was made up on a balanced basis and that sufficient variety was included, the average amount of fattening concentrates (grain) required daily over the entire feeding period would be 2% of the 980 pounds. This would be 19.6 pounds of grain per day. For the quick fattening of the younger classes of cattle, the higher percentage figure is usually safer to use as the total nutritive requirement for the younger classes of animals is greater than it is for the older mature class. Fat supplements for cattle rations is not desirable as cattle cannot digest fat efficiently in more than a moderate amount of fat. However, the fats ordinarily contained in well-balanced, highly digestible fattening rations

for cattle are not only usually well within their tolerance but are also about maximum for efficient meat and fat production.

Vitamin and mineral requirements have been discussed under those heads. As the soil of our farms becomes more and more depleted of the essential trace mineral elements, grain and forage produced on this depleted land will contain less and less of these elements and the likelihood of the development of unusual and more frequent mineral defficiencies in our livestock increases. It is, therefore, only good judgment to supply livestock a complete balanced mineral supplement containing all of the essential, as well as trace, mineral elements on a free choice basis. Various vitamin deficiency diseases, too, are on the increase in our feed lot fattened cattle and sheep, hence, it behooves us to make certain of the vitamin content of the various feed ingredients that are used, and to supplement the rations, when necessary, with appropriate vitamin concentrates to insure vitamin adequacy.

Range cattle for the greater part of the year may satisfactorily subsist on natural grass pasturages. At breeding time, it is often beneficial and economically sound to "flush" them by supplying a moderate amount of protein supplement and possibly some grains, such as shelled corn, in order to stimulate metabolism in general and hasten the occurrence of estrus. For this purpose, the protein supplement is most economically fed in the form of cubes or pellets. Most manufacturers of soybean oil meal and cottonseed oil meal, in addition to supplying these products in cake form, supply them also in cubes and pellets. This protein supplement feeding may be carried on to advantage a few weeks before calving as an aid in stimulating the flow of milk at the time of parturition. The amount to be fed in both of these instances will vary considerably with the general physical condition of the cows. Usually from 1 to 1.5 pounds of the cubed or caked meals are sufficient. In certain localities during the winter, when snow covers the ground and the weather is severe, it is often desirable that the protein supplements be fed along with the usual amount of grain and hay to maintain the range or breeding herd in good physical condition.

Because of the high price of milk, the dairy calf should be fed a limited amount of milk—a gradual shift to calf meal should be begun at from one week to 10 days of age

The feeding of calves is a big subject in itself but the information on this subject, as issued by the various agricultural experiment stations, is voluminous and most of the major problems as they affect various producing areas have been worked out.

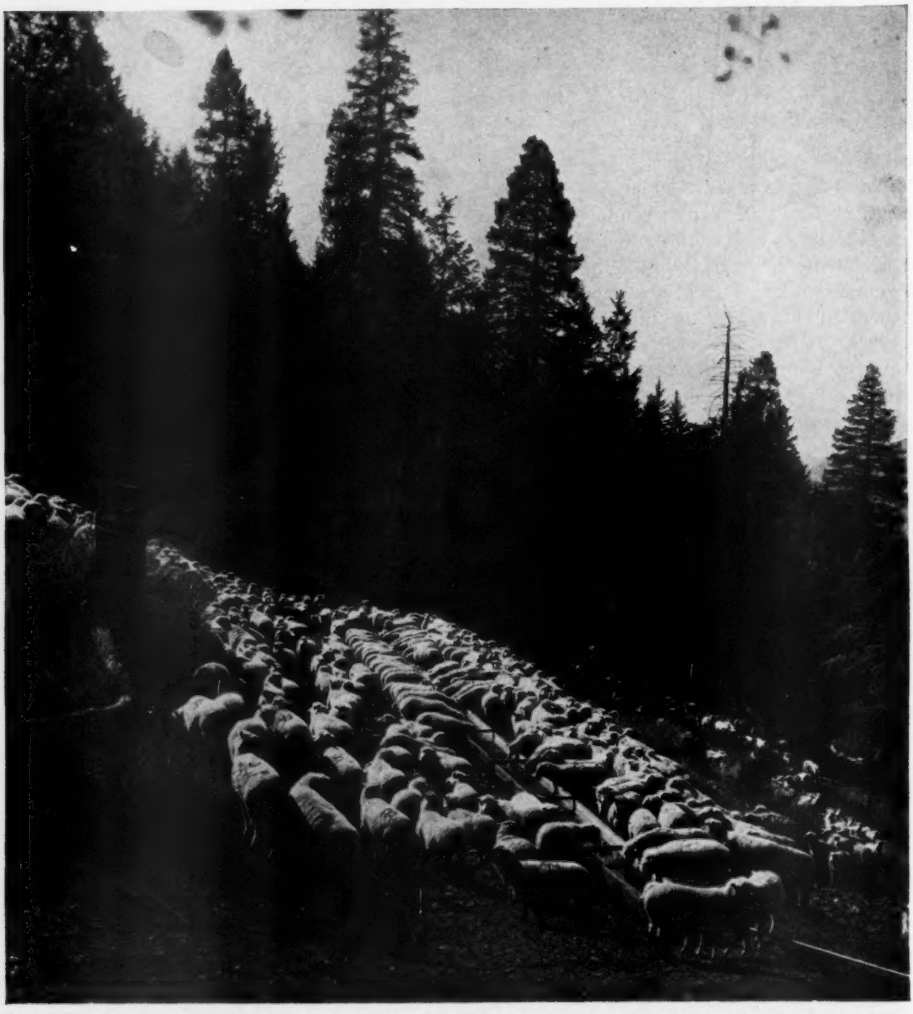
In the range country, the only practical way of raising calves is to allow the calf to suckle its mother until she naturally weans it, and to provide creeps which are kept well supplied with a good nutritious calf meal for the calves to run to. In this way, the calf starts eating a grain mixture at an early age and this as a supplement to its mother's milk and the pasturage that it eats makes for an efficient calf raising operation on the range.

However, the raising of the dairy calf offers an entirely different problem. Owing to the high price of milk at present, it is desirable that calves be fed only a limited amount of milk after the first two to four weeks of their lives, and that a gradual switch is made to one of several proved calf meals. This should begin at the early age

of one week to ten days. By the time the milk is dropped entirely from its diet, the calf is taking some alfalfa hay, or other good quality hay, as well as crushed grains, in addition to the calf meal—depending on the method of feeding being used.

Feed Requirements of Sheep and Lambs

The same general principles are applicable to the feeding of breeding and range sheep as to that of range and breeding cattle. The practice of flushing ewes and feeding the ram well on a highly nutritious diet at breeding time, starting usually about four weeks before it is decided to start breeding is an old custom observed extensively in this country. The benefits of this practice are marked and pay a good dividend. Many sheep ranchers feed a small amount of grain and protein supplement in the form of cake or cubes to their ewes all winter, particularly when the weather is severe and the nutritive requirement is high. Then, four to six weeks before lambing time, the protein supplement and grain



If lambs and ewes, instead of being turned on lush fields, are confined in sheds for extended periods, without green feed or direct exposure to sunlight, it is necessary to supplement the ration with vitamins A and D

feeding is usually increased and continued as long as the ewes and their lambs are around the lambing camp, in an amount consistent with keeping the ewe in good condition and stimulating an adequate milk flow. The smaller flock owners, and occasionally some of the larger sheep ranchers, provide creeps for supplemental feeding of the lambs. A good nutritious grain mixture containing a liberal amount of protein supplement is supplied the lambs in these creeps. Lambs handled in this manner usually pay well for the feed given them in the creeps.

The dry lot fattening of lambs offers devious nutritional problems. Again, the same general principles apply to lamb feeding as to cattle feeding, namely, the building up of a balanced diet for the particular operation in question—using home grown grains and supplementing them with suitable protein and mineral concentrates. The protein requirements vary with the stage of feeding of the lambs. When first they are put into the feed lot, from pasture or range, a narrow nutritive ratio is needed because the protein requirement is high for the growth and development of the organs of digestion. In general, the nutritive ratio of one part protein to six parts other digestible nutrients is considered satisfactory. This ratio is gradually widened, however, until when the lambs are on a full feed of grain, it will approximate one part of protein to 7.24 or 7.5 parts of other digestible nutrients. The concentration of digestible nutrients will have been increased from a possible 60% on the starting and conditioning ration to an approximate 70-73% on the full feed ration. All changes in feed concentration on lambs going on feed must be made gradual as these animals are quick to react adversely to any sudden change in amount or kind of feed. Their maximum carbohydrate tolerance is quite critical but also quite variable with weather conditions. If not fed pretty well up to their tolerance, gains may be slow and costly. If the ration is kept within a reasonable nutritive ratio of protein to carbohydrate and fat and the grain constitutes not over 60% of the total feed in moderately cold weather, a minimum death loss due to dietetic causes should be experienced and a quite satisfactory gain obtained.

The protein requirement is only that which is necessary to balance up the ration and the kind of protein supplement supplied should be figured on the basis of the cheapest cost of a unit or pound of digestible protein. Soybean oil meal, cottonseed oil meal, digester tankage, meat scraps and linseed oil meal are all excellent protein supplements for lamb feeding. They may be used separately or mixed as depends on the feeder's preference. It must be remembered that the use of an insufficient amount of protein supplement results in a ration which is too wide in nutritive ratio and severe death losses may result. On the other hand, under usual market conditions, the use of too much protein supplement is wasteful on account of the high cost of these feedstuffs and there is a waste by the animal mechanism in converting proteins to energy supplying elements.

The vitamin and mineral requirements are also similar to those of cattle and have already been discussed. It is undoubtedly very cheap insurance of a mineral adequacy to supply lambs in the feed lot a good, complete, balanced mineral supplement on a free choice basis. By so doing, very little wastage is experienced as they will consume only that amount which they require to satisfy their appetites and their mineral requirements. Many of the larger feeders in the middle west, who feed a completely mixed ration, incorporate from 1 to 2% of a complete mineral supplement in their mixed feed formulas thus being sure that no essential mineral is lacking in the diet. It is the concensus of experienced sheep nutritionalists that, under ordinary conditions, when high quality, well matured grains and properly cured, good quality hays are supplied to sheep and lambs that an adequacy of the various vitamins are also supplied. However, the exception to this is when ewes and lambs are kept confined in sheds without direct exposure to sunlight and green feed for extended periods of time under such conditions it is necessary to supplement the ration with vitamins A and D. For this, vitamin A and D feeding oils are satisfactory.

Autobiography of a Veterinary Practitioner

By E. T. BAKER, Moscow, Idaho

XIX

Interesting Experiences

NATURALLY, after having had four years' varied experience in state and college work and after having made over 30,000 professional calls as a country practitioner in the past twenty-nine years, a multitude of interesting experiences could be related.

However, I have had to listen to so many long-winded yarns myself, I am not going to burden the reader with many of my "tall tales." Every veterinarian, no matter what kind of work he is engaged in, will have more or less of the out of the ordinary experiences and what may be intensely exciting to him may be very tiresome to his listener.

In practice, one of the most interesting parts of our work is to note the end-results on so many cases. Every week I have a patient get well that, by all visible symptoms, should die and then one dies that does not seem seriously ill. Consequently, when I give a prognosis nowadays, it is as fool-proof as the statement of a Philadelphia lawyer.

When I am pinned down, and have to answer what I think the chances are, the reply is usually: "Well, if nothing now unforeseen happens, and it acts like most cases of this type, it has a fifty-fify chance." Now, that is definite enough for any stock owner, and he seems perfectly satisfied, although just what it means I have never been able to figure out.

However, I do not believe in being hypocritical, and exclaiming at every case "It is the worst I have ever seen." We had a physician locate in our town who soon became the laughing stock of the entire community. He blathered and scared his clients by holding out very few chances for even a common cold. As the saying goes, he "lasted quick" in our locality.

Many practitioners have had to learn by several embarrassing moments that not all milk fevers recover, and that not all cases of canine distemper die. Suppose you broadcast in a clear and loud voice:

"Don't worry; that cow will be up and fine as silk by noon."

Then, when high twelve rolls around, the owner calls up, and tells you "that cow ain't gettin' better no faster," and when you drive out again, you find her to be one of those cases that will do everything but live.

Another time, you tell your client to take his pup out and shoot it, as it is hopelessly ill with canine distemper. A neighbor tells him to give the pup some gunpowder and lard. It happens to be one of those cases just ready to take a turn for the better, and it recovers. Is your face red?

One experience will illustrate what the average practitioner goes through and still lives. The only way I can explain it is that God tempers the wind to the shorn lamb, and protects the simple-minded. One night I was called out in the country about seven miles by a farmer whose father had died in an insane asylum. I found a horse with a very bad case of impaction, and was too busy to think of much else. Sending Art (for that was his first name) into the house for some warm water, I was surprised to see a little boy crawl out of a haymow and say:

"Dad chased Ma and us kids up in the orchard with a gun. He's feelin' pretty mad tonight." He then disappeared. This was cheerful news to say the least.

About this time Art came into the barn, carrying a bucket of warm water, a cake of soap, and a big butcher knife for cutting the latter. I made up an enema, and, after the injection, the patient began to grow easier. We talked about the crops and some of the neighbors, when Art picked up the knife and came walking over towards me.

"Doc, if them neighbors don't keep their stock out of my grain, I'm a-goin' to cut their throats." Then, to make his words more emphatic, he pointed the knife at my Adam's apple, which was slightly quivering, and that is no underestimate.

I volunteered a rather hollow, unenthusiastic laugh, but it did the work. About that time the mare turned around, and I asked Art to hold her. Then, we began talking about baseball, and, as he had been a pretty good amateur player, he laid away the knife and seemed quite rational. I washed my hands, and vanished to my car. The next afternoon, he became violent again, and it took the sheriff and several husky deputies to restrain him, and take him to the asylum, where he now is.

One year, during the deepest part of the depression, I had four clients commit suicide. I felt the loss of two very keenly, for they owed me bills, and, as I never sent their families any statement, of course the entire accounts were filed in my "Reward in Heaven" drawer. Two of these men shot themselves; one hanged himself and the other drowned himself in a water trough.

Always being an amateur photographer, I have carried a Graflex with me for over 25 years, and have a collection of some 500 pictures of almost every kind of disease, accident and abnormality known. One of my prize snapshots is that of a true hermaphrodite in the horse, which has been run in VETERINARY MEDICINE.

Many interesting cases occur after dark or on rainy days, when the weather is not favorable for good photography. I have never used a flash-bulb, as I do not think a farmer would appreciate using this around his stock or in the barn.

An instance that is hardly believable occurred several years ago, and I am sorry that I do not have a snapshot to uphold my veracity. A farmer had turned a four-year-old mare out in the barn yard one rainy day, with a common halter on her head. In one corner of the yard was an old, homemade harrow, manufactured with square railroad spikes. In some way or other, the mare caught her halter in the harrow, and becoming frightened, threw the harrow up in the air. When it came down, it landed on her back, and half a dozen spikes penetrated her lumbar and sacral regions to a depth of several inches. Hearing the commotion, the owner came out and took one look, and then called me. In the meantime, he cut the halter loose, thus allowing the animal to carry her head in a normal manner. I gave the animal a sedative, and then three of us tried to remove the harrow, but to no avail. We had to lead her over to a shed, and, with the aid of a wire stretcher, remove the harrow. Applying a little barbwire balsam to the punctures, she made an uneventful recovery.

One day last summer, a wildly excited female voice called me over the phone, and urged me to rush up to her house without delay. When I arrived, I found a large Maltese cat perched up on top of a book case wildly clawing the air. The history of the case was that the cat, a dignified member of our highest feline social set had accidentally stepped on a sheet of sticky fly paper. At first his royal highness was not disturbed, and he regarded the incident with a bored air of annoyance. Then, all of a sudden he had let out a yip, and started running around the room, knocking over several vases and tearing things up in general. Finally, he landed where we found him. Now, we like cats, and can pet them with impunity, and pretty soon we had Mickey's nerves quieted down, and the fly paper was removed.

Then, there was the case of the pup who had swallowed a needle and thread. Two young women brought the patient down to me, and I could feel the needle in the pup's throat. One of the girls held the patient, while I made a little incision through the skin, but at the first drop of blood, she be-

came deathly white and fainted. I handed the pup over to the other girl, and gave the unconscious one a few whiffs of aromatic spirits of ammonia, and she soon recovered. Then, the second girl became white, and I had to "bring her to," also. However, the needle was not difficult to remove, and pretty soon all three were on their way not much worse for wear.

I could continue for many pages along the same line, but all of us in practice have equally interesting experiences, and we see the ludicrous and the tragic in our every day work.

(To Be Continued)

Atypical Necrotic Laryngitis in a Calf

Early in February, 1943, a one-month-old Hereford calf was received at the veterinary clinic of Kansas State College with a history of having suffered with severe inspiratory dyspnea for about two weeks, and of being unable to suckle. The animal was noticeably emaciated but showed no abnormal rise in temperature. It presented a typical syndrome of calf diphtheria.

Upon examination of the oral cavity no outstanding morbid changes of the pharynx or larynx, other than a mild serous inflammation, could be recognized. However, the case was diagnosed as calf diphtheria.

The calf was treated for two days by intravenous injections of sulfapyridine sodium in doses of 60 grains, in a 5% aqueous solution. No improvement was realized. On the 3rd day a different procedure was followed. The sulfapyridine sodium was first administered *per os* by means of a dose syringe. Much difficulty was encountered. The second dose was given in capsule. An attempt to feed the calf some pre-warmed milk by means of a dose syringe caused violent choking. Artificial respiration was administered to prevent almost certain asphyxiation. Later, the calf was given an enema for stimulation. This was followed by a subcutaneous injection of 60cc of a 25% dextrose and an equal amount of 0.85% saline solution. The third dose of 45 grains sulfapyridine sodium was given *per os* by means of a dose syringe, milk being used as the vehicle. The last dose was given in a capsule. At this time the calf appeared to be somewhat improved and early on the 4th day a 45-grain dose of sulfapyridine sodium was given in 50cc of warm milk by

using a dose syringe. The animal appeared to be doing as well as could be expected, but that afternoon it died.

Post-mortem examination revealed a larynx swollen completely shut, but containing no visible necrotic (diphtheritic) membrane. Although there was a slight pneumonia, most of the lung tissue appeared normal. Acute catarrhal enteritis was extensive throughout the small intestine. Reluctantly, the post-mortem diagnosis of laryngitis was made. No primary etiological factor seemed evident.

After some persuasion on the part of another clinician at the hospital, a more thorough examination was made. After incising the swollen walls of the larynx, a yellowish, cheesy exudate was found deep in the submucous tissues. Thus, the necrotic membrane of the larynx was found, not in its usual location upon the mucous membrane, but embedded deeply, adjacent to the cartilaginous tissue.

These findings, therefore, accounted for the appearance of the laryngeal mucosa at the time of initial examination. As for the normal temperature shown during the whole period of treatment, there is no explanation other than the fact that the infection had remained local, no septicemia resulting. In conclusion, it may be stated that the diagnosis and treatment were justified, in spite of the fact that no diphtheritic membrane was visible upon clinical examination.

RUSSELL G. MINNIS
Manhattan, Kansas

Constipation in a Bull Caused by a Rectal Tumor

A three-year-old Hereford bull was presented at the veterinary clinic of the Kansas State College for treatment. The anamnesis was that during the past two months the bull had shown increasing difficulty in defecation. When defecation was attempted, the animal strained continuously, but only a small amount of feces resulted. The owner reported that the intervals of attempted defecation had become progressively more frequent and the amount of feces voided smaller during the past month.

This bull had been kept in a feed lot all winter with three other Hereford bulls on feed consisting of silage, cane fodder and grain concentrates. The other three bulls had been maintained in good condition through the winter; however, this bull had been progressively losing condition with no symptoms of anorexia.

The animal appeared somewhat emaciated. Examination showed normal temperature, respiration and pulse. In attempting a rectal examination the rectum was found to be partly occluded and the hand could be inserted only a few inches beyond the anal sphincter, due to a firm, nodular, neoplastic growth about three inches anterior to the anal sphincter. This tumor was approximately 2½ inches thick, 4 inches long, and extended almost two-thirds around the circumference of the rectum. It was covered by a bloody mucous surface. Only two fingers could be forced into the small rectal opening beside the tumor.

The diagnosis was neoplasm of the rectum, with constipation a secondary condition produced by the rectal stenosis.

The owner was advised that a radical operation could be performed to remove the tumor; however, due to the comparative inaccessibility and the size of the neoplasm, a very unfavorable prognosis was given. Immediate slaughter of the animal was recommended as the most economical procedure to follow.

According to Runnells,[1] "Tumors of the intestines are not very common. The results are local stenosis with resulting changes, metastasis, and tumor cachexia."

EARL J. SPLITTER

Frederick, Kans.

[1] Runnells, R. A., *Animal Pathology*, 1941, p. 352.

Pulmonary Abscess in a Sheep

A four-year-old, Hampshire ewe was presented for treatment to the veterinary clinic of the Kansas State College December 7, 1942. She had been off feed and apparently in some pain for four days. The owner had wormed the flock two months previously, using a phenothiazene suspension administered *per os*. One other ewe

had been found dead in the lot without having shown any symptoms of ailment and no post-mortem examination was held. The principle feed was alfalfa hay.

The patient displayed the following symptoms: Anorexia, emaciation, dyspnea, pain on percussion of ventral abdominal region, mucus in the feces, constipation, sanguinous vaginal discharge, a temperature of 105.2° F., increased pulse rate and respirations. Auscultation of the thoracic cavity revealed indistinct, dry crepitant rales. The urine was negative for ketones.

A provisional diagnosis of gastritis and indigestion was rendered and eight ounces carron oil was administered *per os* with a dose syringe.

The first night in the hospital the ewe aborted a small fetus of about 8 to 10 weeks and weighing approximately one-half pound. The placenta was passed successfully. She appeared to be improving, and the following day the uterus appeared to be well cleaned up, as there was very little vaginal discharge. The third and fourth days at the hospital were uneventful, but the ewe died unexpectedly the

morning of the fifth day. An occasional slight cough had been evidenced during her period as a patient, and her temperature for this period varied within narrow limits, from 105 to 105.8° F.

Post-mortem examination revealed the following lesions:

The uterus was well contracted and free of membranes, and there was a very slight catarrhal metritis of little significance.

Congestion of abomasum and anterior part of the duodenum was noted. The small intestine presented numerous nodules of the nodular worm (*Oesophagostomum columbianum*).

Congestion of posterior one-half of trachea.

Chief lesions found were in the thoracic cavity. The lungs contained multiple abscesses, varying in size from 1mm to 3cm in diameter. The larger ones contained a caseous, greenish to whitish-yellow material. Some of the abscesses projected above the pleural surface of the lung and were fairly well circumscribed. There was a foul odor to the pus, somewhat characteristic of necrophorus infection. The mediastinal lymph glands were edematous and swollen, but contained no abscess formation.

Pus smears were made from several abscesses and stained with Gram's stain. They revealed numerous bacterial forms with a number of different organisms represented; such as, Gram-positive cocci in short chains and clusters, Gram-positive very short rods, Gram-positive longer rods, and quite a few Gram-negative long rods. The latter were the longest in the smears. The number and variety of organisms would have made culturing difficult and probably fruitless.

Sections of these abscesses were prepared and stained with hemotoxylin-eosin for further microscopic study. These sections revealed a catarrhal or bronchopneumonia, with congestion, bronchitis, peribronchitis, bronchiolitis, peribronchiolitis, and numerous circumscribed areas of abscess formation. There was a zone of cellular infiltration (mostly polymorphs and lymphocytes) and bacterial activity surrounding the abscesses which grossly appeared to be a connective tissue capsule, but they were not encapsulated. The centers of these lesions contained caseated necrotic material surround by a zone of dead bacteria, pycnotic and karyorrhexic nuclei, and other cellular detritus, which in turn was surrounded by the active zone described above. The cellular flora consisted mainly of polymorphonuclear cells, macrophages and lymphocytes. These cells decreased in number outwardly from the abscesses, and compensatory emphysema was noted in some portions of the lung. There were numerous clumps of large, rod-shaped bacteria and phagocytic cells, as well as other forms, in some of the alveoli. There was also some thickening of the interlobular connective tissue.

The definite etiological factor was not established due to the complexity of the infection. The symptoms and history were rather similar to those of "lungers" disease in the West, as described by Udall, Runnells, Marsh, Creech, and others; but necropsy discounted this, because in "lungers disease," there is definitely more fibrosis and consolidation in the lungs, with few or no abscesses. The abscesses, although somewhat caseous, were not laminated or typical of caseous lymphadenitis nor were the regional lymph glands involved beyond the extent of some edema and swelling.

It appeared to be a more or less chronic suppurative bronchopneumonia of aspiratory rather than metastatic origin since there were no primary seats of infection elsewhere in the body.

The congestion of the lower one-half of the trachea was probably due mostly to hypostasis and the congestion in the abomasum and interior part of the duodenum may have been of dietary origin since the alfalfa hay being fed was of poor quality—largely stems containing many weeds.

The abortion was probably due to a lack of sufficient fetal nutrition coupled with a possible toxemia. The ewe was extremely emaciated, had not eaten for four days, and was receiving an inadequate diet.

This is one of those complicated cases which is difficult to explain to the owner, and to satisfy oneself as to the etiology. It is possible that some of the phenothiazene suspension may have been aspirated

when given by the owner two months previously and, instead of going over to gangrenous pneumonia, resulted in a chronic inflammatory bronchopneumonia with abscess formation. This is only one probability—there are many others; such as, independent necrobacillosis of the lung, material other than the phenothiazene being aspirated, atypical pseudotuberculosis of the lung, etc.

While this case was not particularly significant, it shows how mistaken diagnoses may sometimes be made and how complicated cases may be. In this instance the abortion which was only an incident diverted the diagnostician's attention completely away from the seat of the trouble. However, it is such cases that make veterinary medicine interesting to those engaged in the practice of it.

ALBERT S. COATES

Kansas City, Kansas

Pyelonephritis In a Holstein-Friesian Cow

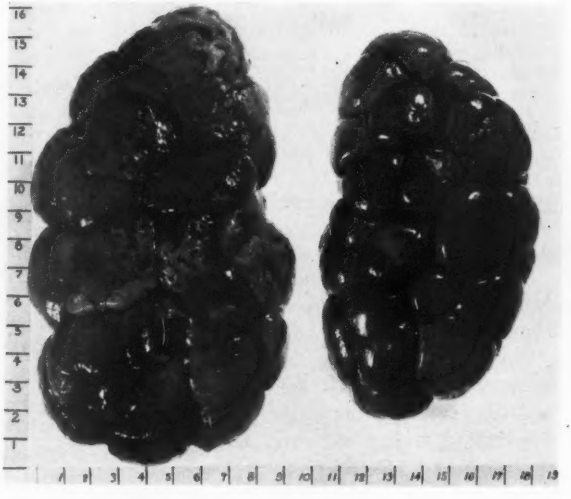
Usually one or more cases similar to the following, are presented each year for treatment at the veterinary clinic of the Kansas State College.

"Pyelonephritis is a focal inflammation of the kidney with small areas of softening in the cortical layer, diphtheroid destruction of the papillae, and involvement of the pelvis and usually of the lower urinary tract. It usually runs a chronic course, and is caused by various bacteria, particularly the Bacillus seu Corynebacillus renalis (nephritidis)."*

March 4, 1943, Doctor Moore of the clinic was called on to diagnose and treat a cow which was owned by the Dairy Department of Kansas State College. She was a large, seven-year-old, purebred Holstein-Friesian. For six weeks previous to parturition this animal had shown symptoms of some obscure illness. Her weight appeared normal but she lost weight during this period, although she ate side by side with cattle which gained weight on the same ration.

She had calved two days before. Her calf was a rather large male (120 pounds) with contracted flexor tendons of both front legs. Even after surgical correction of the contracted tendons it did not appear healthy. All former calves of this cow had also been males.

The two front quarters of the udder had been rendered useless by mastitis, and the cow had presented more or less of a sterility problem most of her lifetime. She had come in estrum several times during her last gestation period, several of these heat periods being approximately 21 days apart. It had required approximately nine months from her last parturition before another conception could be induced. These facts are mentioned because male calves, and sterility and parturition problems are often associated with some organ disfunction or ill health.



The kidneys weighed 6 and 7.5 pounds. The usual weight is about 1.5 pounds

Following is a history of calls, treatments and post-mortem findings:

March 4—Symptoms: depression, stasis of the rumen, constipation, temperature 103.5°F. Rectal palpation revealed the left

*Hutyra, Marek, and Manninger, 1938. Vol. III, p. 39.

kidney to be so large it was impossible to palpate the right one. The left ureter was greatly enlarged.

March 6—Symptoms: remittent fever, depression, anorexia, tucked up abdomen, dehydration; blood clots and some free blood were passed in the urine.

Treatment: one pound of magnesium sulfate plus eight gallons of water *via* stomach tube; 500cc 20% calcium gluconate solution and 500cc 20% dextrose solution intravenously.

March 9—Symptoms were the same as March 6, but with more marked dehydration and distinctly anemic conjunctivae; temperature 100°F., pulse 90.

Treatment: 500cc each of the calcium gluconate and dextrose solutions; transfusion of 800cc oxalated bovine blood; six gallons of water *via* stomach tube.

March 11—Laboratory analysis indicated:

BLOOD PICTURE

R. B. C.	4,150,000.00
W. B. C.	6,600.00
Hemoglobin	7.50

DIFFERENTIAL BLOOD COUNT

Juveniles		1
Stabs		28
Segmenters		33
Lymphocytes	Large ....20 Atypical ..16 Small 29	65

Urine was positive for albumin and blood.

March 13—Continued severe symptoms.

Treatment: eight gallons of water *via* stomach tube. Blood transfusion of 900cc bovine whole blood.

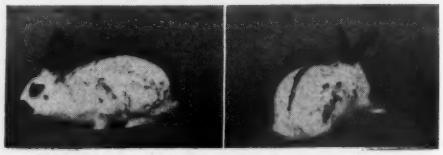
March 16—Patient died. Post-mortem findings: lungs normal; heart flabby; mild gastritis; catarrhal enteritis (small bowel); a severe catarrhal enteritis (large bowel); kidneys 6 and 7.5 pounds respectively (normal weight of bovine kidney is approximately 1.5 pounds); left kidney was about 17 by 10 inches in size; blood clots in both ureters—the left ureter was enlarged to about seven times its normal dimensions and contained a fibrino-necrotic membrane; cervix was partially dilated—three fingers could be inserted easily; bladder showed cystitis with a fibrino-necrotic membrane present.

RICHARD OLNEY

Cassville, Mo.

Three Rabbit Ailments

I am rather surprised that the question of soiled greenstuff has not been referred to in recent papers on the cause of death, especially in weaners and young rabbits. For several years I have advised rabbit keepers to wash all greenstuff in salt and water and leave it to wilt before putting down as food. Rabbit owners commonly feed green weeds in much variety to rabbits, and yet a great percentage of these foods is soiled by birds, dogs, cats, vermin and



even by human beings. Post-mortem findings are generally inflammation of the stomach at the pyloric end and surfeit or fermentation of food in the intestines. The simple precaution of salt and water washing and drying will reduce mortality almost immediately.

Three affections of the liver can, in my opinion, be diagnosed by the clinician: (1) coccidiosis, in which there may be (but by no means always) pin-point or larger spots on the liver, and gland enlargement of the bile ducts; (2) *Cysticercus pisiformis*, diagnosed by the presence of the typical lesions on the surface of the liver, accompanied often by a "mosaic appearance of liver streaks," and (3) pseudo-tuberculosis—rather rare—by slightly raised, fairly large spots.

Supporting the liver findings there may be coccidia in the intestines, tape-worm cysts in the mesentery, and nodules in the bowels (indicative of pseudo-tuberculosis).

G. MAYALL, MRCVS

Bolton, England

★ ★ ★ BUY WAR STAMPS ★ ★ ★
AND BONDS

Abstracts

Serum and Plasma in Shock

On the basis of their experience with shock in dogs produced by graded hemorrhage, Levinson[48] and his associates feel that concentrated blood protein solutions must be used circumspectly, especially in dehydrated individuals. Concentrated plasma or serum was less effective in alleviating shock and in maintaining life thereafter than was normal plasma or serum. The state of hydration was an extremely important factor in the ability of an animal to withstand shock and its response to therapy. A more profound state of shock developed in dehydrated animals. Their response to plasma or serum infusion, and particularly to concentrated solutions, was decidedly poorer than that of normal animals. Therefore when concentrated plasma or serum is administered, particularly to dehydrated individuals, the degree and duration of improvement are apt to be incomplete and transient. If only concentrated serum or plasma is available, additional normal plasma or saline solution should be administered at the earliest possible moment. The amount of citrate contained in plasma may be sufficient to produce tetany if large amounts are administered repidly.

Erysipeloid an Occupational Disease of Veterinarians

Swine erysipelas is one of the diseases of animals readily communicable to man.[27] Man is infected by contact, principally from infected swine or fish, hence handlers of fish, butchers and veterinarians are most often affected. In Europe where swine erysipelas has been a serious plague for centuries, epidemics of the disease in man, called erysipeloid, have occurred. In this country where the disease in swine is not yet prevalent except in restricted areas, cases in man have so far been sporadic. Since in this country swine affected with

Skin form of swine erysipelas

swine erysipelas are not slaughtered for food, as is the custom in most parts of Europe, Van Es thinks the disease in man will continue to occur only sporadically, and "will to a large extent remain confined to veterinarians and their helpers, engaged in anti-swine erysipelas vaccination." Of 56 persons (69 cases) infected in Nebraska during the past four years 27 (40 cases) were veterinarians.

The usual site of infection is on the hands and the typical case is a dermatitis, characterized by intense pruritus swelling and an area of red, dark red or purplish discoloration surrounding the site of inoculation. The inflammation spreads to adjoining areas and is accompanied by arthralgia. Sometimes there is an elevation of the temperature. In most cases the skin involvement does not extend beyond the wrist. However, generalized infection and a fatal outcome is by no means unknown. Spitzer reports one, and Gunther two, fatal cases in veterinarians. Unquestionably the use of

[48] Levison, S. O., R. E. Weston, Martha Jonata and H. Necheles, 1943. Effects of concentrated serum in contrast to iso-osmotic plasma on normal and dehydrated dogs in shock. Abst. in *Jnl. A. M. A.*

[27] *Swine Erysipelas Infection in Man*, Van Es, L., 1942. Univ. of Nebr. Agr. Exp. Sta. (Lincoln) Research Bulletin 130.

serum and live culture vaccine and the holding of necropsies on animals dead of the disease possesses a hazard for veterinarians that must be given consideration.

Although annoying, even painful and incapacitating, uncomplicated cases of erysipeloid tend to spontaneous recovery in 10 to 30 days, and even severe cases in most instances recover in that time or a somewhat longer period, if treated with antiserum early in the attack. The author advises the use of 1cc of serum to each 10kg (22 pounds) body weight, repeated at intervals of not longer than four days. The possibility of anaphylaxis is regarded as the chief objection to the use of serum, which appears to be somewhat less effective in man than it is in swine.

Various veterinarians have reported excellent results from local application of serum as a wet pack, with no danger of allergic reaction. This is not mentioned in the bulletin.

Sulfonamides Intraperitoneally

Walter and Cole implanted sulfadiazine crystals in the peritoneal cavity and wounds of 68 patients operated on for various lesions most of which caused peritoneal contamination.[43] A similar procedure using sulfanilamide was carried out on 62 patients. There was an incidence of 4.04% of wound infection in the sulfadiazine group and of 14.05% in the sulfanilamide group. Sulfadiazine appeared superior to sulfanilamide in the prevention of wound infection. One instance of wound disruption and 1 of fatal peritonitis in that series were probably not related to the use of the drug. There were no toxic manifestations and no evidence of delay in wound healing in the sulfadiazine group. A dose of 6gm was adopted as the routine, 4gm being placed in the peritoneal cavity and 2gm in the layers of the wound. The studies on animals and on human beings revealed a much more persistent blood level with sulfadiazine than with sulfanilamide. Sulfadiazine is also less toxic. The longer persistence of the blood level of sulfadiazine over sulfanilamide makes the former drug superior for implantation in the peritoneal cavity and wound layers in a laparotomy. Use of sulfonamides in wounds contaminated by bowel resection has resulted in a much lower incidence of infection, sulfadiazine being superior to sulfanilamide.

Vitallium Tubes for Blood Vessel Anastomosis

Blakemore and his associates[44] report the use of vitallium tubes as prosthesis in blood vessel anastomosis in dogs. Vitallium is a nonirritating alloy suitable for a vein graft or for bridging an artery or vein defect in a nonsuture method of vessel anastomosis. Carefully controlled experiments on dogs

demonstrated that sulfathiazole by mouth contributes greatly to the success of delayed anastomoses of severed vessels in contaminated wounds. They administered sulfanilamide in alternate wounds in a series of 77 anastomoses and found it to be of moderate but definite value. The nonsuture method was shown to be highly successful in anastomosing the small femoral arteries of dogs even in contaminated wounds 24 hours after section of the artery and without the use of anticoagulants. Vein graft anastomosis of a severed primary artery in the war wounded would prevent the loss of the extremity by gangrene if the anastomosis remained patent beyond the period of posttraumatic edema, up to 14 days. Veins taken from one dog continued to function in another when used as transplants to bridge vessel defects. These experiments afford a prospect for the use of preserved veins as grafts for bridging vessel defects in the war wounded as an alternate to the use of homoplastic transplants.

[43] Walter L. and W. H. Cole, 1943. Intraperitoneal administration of Sulfadiazine with special reference to comparative study with Sulfanilamide. *Surg., Gynec. and Obst.* 76, p. 524.

[44] Restoration of Blood Flow in Damaged Arteries: Further Studies on Nonsuture Method of Blood Vessel Anastomosis, 1943. Blakemore, A. H., J. W. Lord Jr. and P. L. Stefko, *Ann. of Surg.*, 117, p. 481.